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The Radio Exhibition.

REFERENCE to each national radio exhibition as larger than its predecessor has become a commonplace commentary, but the magnitude of this year's effort dwarfs all that have gone before. General progress during the past twelve months has clearly been made, but it has been unsensational. The most obvious advance is the coming into general use of the "all-mains" receiving set, introduced at the previous exhibition, in a manner similar to that in which the grid-screen valve became common in 1929, instead of exceptional as in the 1928 show. The mains set should, inherently, be a better piece of apparatus than the battery type from the listener's point of view; it should also provide a load for the public supply systems worth having as an addition to the lighting, especially if, as the tendency appears to be, the energy taken per set increases beyond the present level. At present mains sets are not always regarded by supply engineers as an unqualified boon, but this view is influenced largely by considerations of compensation owing to system change-overs, and is presumably only of a temporary nature. The makers of the sets appear to assume the imminence of a general change-over of distribution systems to alternating current, as the battery eliminator for working off direct-current mains seems to be disappearing from the range of new apparatus. This, we think, implies too optimistic a view, and it is probable that consumers of those undertakings which continue to supply direct current will have to remain satisfied with batteries for some years ahead.

The present sober rate of development, relatively to that of earlier years, is by no means a matter for regret. Rather should it be taken as an opportunity to emphasise the serious technical and commercial aspects of radio. These aspects were apt to be obscured in the age of the enthusiastic amateur, with his new circuits, destructive of fundamental theory, and his bewildering jargon of electrical terms. Those were the days when "wireless experts" opened short-lived businesses next door to one another, trading largely in inferior foreign component parts for the home-constructor.

The radio industry is not yet freed, however, from the

necessity of conceding something to the puerile desire of the public for novelty each year; it therefore finds itself unable to lay its plans very far ahead for the standardised manufacture of tried designs. This we believe to be a passing phase, and there are now signs that the user is coming to regard quality of performance as of greater value than new features.

The public in this country is indeed well served by the radio industry. Tangible proof of this is to be found in the fact that an overwhelming majority of receiving sets in use is of home manufacture. Many of our firms manufacturing radio apparatus have long been known in other fields of engineering, and the newer development of their activities is characterised by the sound design and workmanship on which their reputations have been built up. Indeed, it may confidently be said that the best of the British sets are the best in the world, whether in internal construction or in exterior finish.

In this number we devote several pages to a report of the principal exhibits and an account of our impressions as a result of our visits to Olympia. We feel that the exhibition is of too important a character for summary treatment, since it is one of the few occasions in the year offered for dealing with radio work as a whole. We therefore propose to publish after its close a further article by a recognised authority on the subject, in which the principal lessons to be learned will be summed up. In conclusion, we can say that at Olympia is a display of which any Briton may well feel proud.

The General Electric Issue.

One of the principal electrical events in the financial world during the past week has been the issue of £3,500,000 5 per cent. mortgage debenture stock by the General Electric Co., Ltd. The issue of 7 per cent. debenture stock was made at a time when high interest rates were unavoidable, and the chairman and his colleagues have been waiting for a suitable time to give holders a favourable opportunity to convert their holdings and to bring down the prior charges in the annual financial statement. The affairs of the company have been very much in the public eye during the last year or two owing to the American interest taken in its securities, to the policy and controversy relating to the voting rights of certain holders, and to the continued progress of the business. The success of the issue was practically a foregone conclusion, but it affords one more proof of the strongly entrenched position of the company in the British electrical industry and the favour with which its future is regarded by investors generally. The company can now continue to go forward with a more reasonable total of debenture charges, and at the same time with an additional amount of capital available for further expansion of the business for which, as the electrical industry is an ever-developing one, there should be good scope.

Industrial Prosperity Meeting.

Again and again efforts have been made to secure the setting up of a sort of Parliament of Industry. There have been industrial groups formed at St. Stephens's from among selected politicians who were reputed to possess a specialised knowledge of the needs of industry, so that it might receive encouragement from Parliament as a whole, and that proposals likely to affect its interests adversely might be watched for and closely examined. They have no doubt answered their purposes up to a point, but to-day everybody seems to recognise that our national affairs have come to such a pass that some big effort, bigger than any ever before made, is required to cope with an unprecedented situation of depression and unemployment. Whether one is a politician or not one must see that there is a weight hanging around the neck of nearly everybody who normally should be able to contribute to the work of improvement, and, with the burden of the last Budget only now beginning to affect so many industries and people, hope is hard to raise. It is well, however, that some of our leading industrial men should set a good example, and in forming an interim committee to provide for the establishment of a National Council of Industry and Commerce they have done well. The movement has been started by Sir William Morris, and the announcement calling a meeting in the City for yesterday afternoon is signed by such men as Lord Melchett, Sir E. W. Petter, Sir E. Manville, Sir Hugo Hirst, Bart., Sir Felix Pole, Sir J. Thornycroft, and Sir Woodman Burbidge. The meeting will consider the setting up of the proposed Council to further by all possible means the economic and financial prosperity of Great Britain. The idea is for a body of business men to get together with the determination, if it is humanly possible, to restore prosperity to their country and to ensure employment for its people.

The measures proposed for achieving this object include the proper protection of the Home market and the advancement of the cause of inter-Empire trade by every possible means. It is the signatories' avowed intention to keep entirely free from party politics and to bring into political life "that measure of practical commonsense without which the business of Great Britain and of the Empire cannot be conducted."

The proceedings should be interesting. As the signatories to the letter state: "The . . . meeting calls for no excuse." Having watched so many past efforts one wonders whether one more meeting, and one more movement, can have any early or marked effect upon the situation, but something must be done. Who can tell what has been the combined effect of many isolated efforts in the past ten or fifteen years? Writing before yesterday's meeting was held, we can at least await its programme with interest and hope.

Warrington Rural Supplies.

The rosy pictures sometimes given in the lay Press of farming prosperity merely as a result of bringing electricity to the countryside has often caused mental discomfort to electrical engineers, who by their training are themselves addicted to a more scientific regard for probabilities.

Nevertheless, in the barrage of facts and semi-facts some truths may find a widely spread target. Thus a regard for the necessity for overhead distribution has influenced the attitude of persons in a position to obstruct progress. An illustration of this is to be found in the recent experience of Mr. F. V. L. Mathias, who has in hand a scheme for giving supplies in the rural areas adjoining Warrington. In that case the leader of the opposition to the overhead lines himself requested the holding of a special meeting of the parish council concerned in order to reverse a previous meeting's unfavourable decisions, for which he had been responsible, on the ground that the farmers would be deprived of electricity unless the supply could be brought overhead. Another point which appeared to carry weight with the council was the information that the price charged for electricity would be the same as in Warrington itself. A concession of this kind is, we think, likely to smooth the path of other negotiations of a similar nature.

The N.W. Midlands J.E.A.

Local activities in transmission line construction tend perhaps to be obscured by the more striking work carried out by the Central Electricity Board. During the past few weeks we have reported the raising of the voltage on the Bedford-Little Barford line from 33 to 132 kV, the first line to be run at more than 66 kV in England.

Side by side with these ambitious projects is the provision of regional nuclei at lower voltages, and the work of the Joint Electricity Authorities in this connection must not be overlooked.

The youngest of these is the N.W. Midlands J.E.A., which, guided by Mr. C. H. Yeaman, has just completed its first important transmission scheme, a 33-kV line running from Stoke-on-Trent to Stafford, *via* Newcastle-under-Lyme and Market Drayton. The building up of local transmission systems in this way, ready for connection to the C.E.B. lines, should help materially towards the success of the national scheme.

Current in X-ray Tubes.

A Method of Compensating for the Effect of Capacity Currents in Measuring Instruments.

By L. G. H. SARSFIELD, M.Sc., M.I.E.E.

THE current flowing in an X-ray tube (except for incidental "inverse") is unidirectional and is generally measured by a moving-coil milliammeter which indicates the mean value. It is customary to find the instrument inserted in the high-voltage

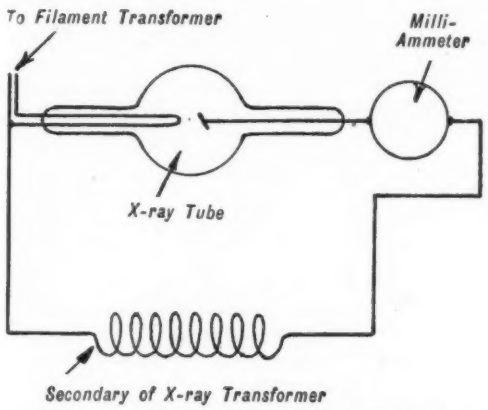


Fig. 1.—Measurement at High Voltage.

line as shown in fig. 1. Several obvious disadvantages, such as the need for insulating supports, the risk of corona, the effect of static charges, &c., are associated with the use of an instrument at high potential, and consequently it has been necessary to adopt special designs.* A number of patterns are now commercially available.

An instrument in a high-voltage circuit must also be remote from the operator. It is clearly much better to have the instrument which indicates the X-ray tube current close at hand and, for preference, actually on the control panel. This is particularly important when, as with certain industrial applications of X-rays, the operator is screened from the specimen under examination and also from the high-voltage gear. It is possible to mount the milliammeter on the control panel if it is connected in that part of the X-ray transformer secondary which is at earth potential, and if such a point be available.

At present it is unusual to have an X-ray tube working with one end solidly earthed, and the connection of an instrument in an earthed line is, therefore, not often possible. With both ends of the X-ray tube at high potential, the only place remaining for the introduction of the milliammeter which allows us to secure the advantages of earth potential is the middle of the transformer secondary winding.

One familiar way in which this may be done is shown in fig. 2. The instrument is in this case connected in circuit where rectified current is flowing, and hence the usual moving coil type is suitable. Since the instrument is earthed, there is no need for the elaborate precautions for avoiding corona, charging of the glass, &c., which have already been referred to in connection with instruments in high-voltage lines. It will be observed, however, that in this arrangement the transformer secondary is only earthed through the rectifier. Two rectifying disks (arms or other suitable devices) and two secondary coil stacks are required.

* L. G. H. Sarsfield. "The Electrical Equipment of X-ray Apparatus," *Journal* I.E.E., 9129, Vol 67 page 454.

Each end of each stack must be insulated for stack voltage, as shown in fig. 3a, because each end is alternately at earth and high potential. This demands a more expensive and bulky transformer, since the end-clearances of the high-voltage winding must be duplicated and four terminal bushings be used instead of the usual two in the mid-point-earthed design as shown in fig. 3b.

The obvious thing to do, therefore, is to connect the milliammeter in the middle of the secondary winding of the mid-point-earthed transformer. This can be done by earthing one end of one half of the secondary to the tank at a terminal in the lid, say, and bringing out the adjacent end of the other half of the secondary through an insulated terminal mounted alongside the first, and connecting the milliammeter across them. This simple arrangement is ideal from the point of view of transformer design, but has certain disadvantages, the surmounting of which has been the subject of investigation in the Research Department, Woolwich.

First of all, it will be noted that a milliammeter connected actually in the transformer secondary winding will carry unrectified current for a period in every cycle the length of which is governed by the type of rectifier. Every half wave, or every alternate half wave, or predetermined portions of half waves may be passed by the rectifier, depending upon the number of valves or the pattern of mechanical device employed. The milliammeter must be scaled to read mean values appropriate to the d.c. conditions in the X-ray tube. Unfortunately, the instrument in this location in the transformer circuit carries not only the tube current, but also the sum of the capacity currents flowing in the condenser represented by the secondary windings, the tank core, &c. (see fig. 4).

The magnitude of the unwanted capacity currents depends upon the operating voltage, and, since X-ray transformers are commonly used at any voltage within their maximum range, the error due to these currents

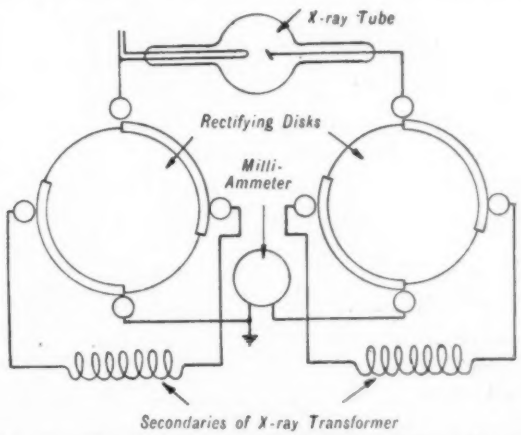


Fig. 2.—Measurement at Mid-point of Transformer Secondary.

cannot be suitably accounted for by calibration. Capacity currents up to 5 milliamperes are usual. Such values are of the same order as the continuous load of a naturally-cooled X-ray tube.

It is impossible to eliminate capacity currents altogether from the transformer. Improvement in design involving the reduction in dimensions of windings is

generally accompanied by a reduction of distance between them and the tank and core so that, although the " plates " of the condenser may be smaller, the distance between them is also smaller and the capacity does not greatly alter. It is true that these capacity currents are in quadrature with the load, but they are

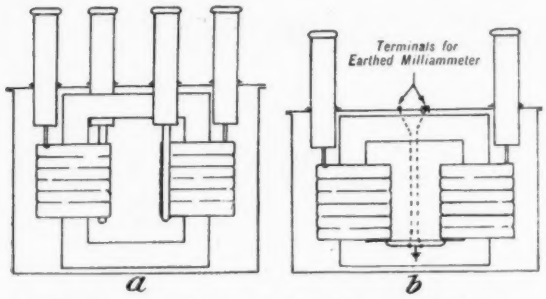


Fig. 3.—Two Types of Secondary Coil Stacks.

large enough, nevertheless, to invalidate the reading of the milliammeter.

No arrangement of shunts or balancing resistances was satisfactory when they were tried, and it seemed necessary to oppose the capacity current in the milliammeter by a current equal and opposite. A scheme and device for this was put forward by Mr. F. E. J. Ochenden† and was tried out by the writer in the Research Department, Woolwich.

The opposition current may be generated in a special earthed tertiary winding of a few turns on the X-ray transformer. The ends of this tertiary winding are brought out and connected to a condenser. Now, in this special circuit will flow a current in phase with (or in opposition to, according to the direction of winding) the capacity current in the X-ray trans former, and it is a matter of adjustment to get the two equal in magnitude, the number of turns, value of condenser, &c., being chosen to suit. If, therefore, this special circuit be connected (see fig. 5) so as to pass its current through the milliammeter in opposition to the capacity current due to the X-ray transformer, the two being equal and opposite will balance each other, and the true X-ray tube current will be indicated by the instrument.

The writer's first experiments were made with an X-ray transformer which could not conveniently be fitted with a special tertiary winding for generating the compensating current. A tiny auxiliary transformer for the purpose was therefore designed with the required constants. The primary of this transformer was connected in parallel with that of the X-ray transformer, and the secondary current had to be in phase with the capacity current of the X-ray transformer. This involved similarity of core design so that the core

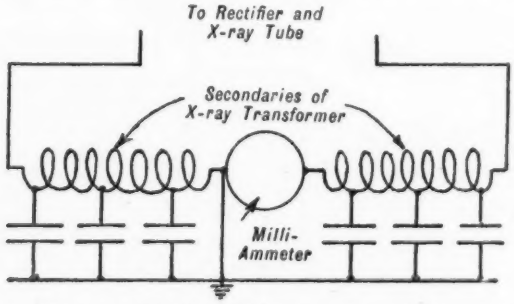


Fig. 4.—Condenser Effect of Transformer.

losses, &c., were of the correct value. The question of voltage was taken care of by tappings on the windings of the auxiliary transformer. The size of condenser used on our compensators is 1 μF. The inductance of the instrument may be neglected. Two compensators of the auxiliary transformer type have already been installed for use with earthed milliammeters in the Radiological Laboratory, Research Department, Woolwich, while in future X-ray transformers it is proposed to include suitable tertiary windings for the same purpose.

We have already seen that the milliammeter connected in the earthed mid-point of the X-ray transformer is carrying alternating current. The ordinary moving-iron type of instrument is not recommended owing to its uneven scale. Moving-coil instruments fitted with copper-oxide rectifiers have been used very successfully in the Research Department, Woolwich. The customary precautions must also be taken for getting rid of high-frequency surges in the milliammeter due to mechanical rectification or to the oscillatory character of the X-ray circuit. An excellent way of arranging the necessary condenser across the instrument movement is to have a centre tapping earthed to the case and frame of the instrument. This permits both of the terminals and the movement to be insulated.

The transformer secondary winding must be earthed at the transformer itself, whether it be earthed elsewhere in the instrument circuit or not. It is possible under the conditions of X-ray circuits to have quite large high-frequency potential differences induced in

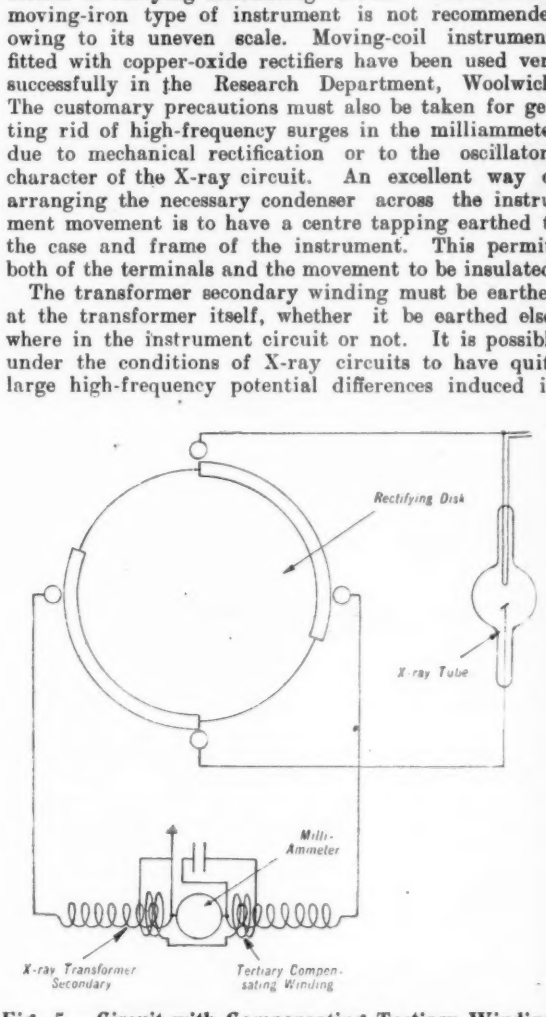


Fig. 5.—Circuit with Compensating Tertiary Winding on Transformer.

comparatively short leads. These voltages, if allowed to build up on the instrument coil, will in time undermine its insulation, and ultimately failure will result due to high-frequency sparking giving place to power burn-out. The writer has measured voltages of 3,000 or so in milliammeter leads 20 ft. long which were solidly earthed at each end.

In conclusion, the belief is expressed that the compensator described above represents another step towards the simplification of X-ray apparatus and towards the convenient measurement of one of the essential quantities associated with it.

The writer desires to thank the Director of Artillery for permission to publish this article, and Messrs. Everett, Edgcumbe & Co., Ltd., for helpful suggestions, and to acknowledge the co-operation of the Director of Radiological Research in the same connection.

† Patent application No. 5,450/30.

The Radio Exhibition.

As we go to press we learn that during the first three days of the Radio Exhibition at Olympia more than 40,000 persons were admitted to the show, and very satisfactory sales of wireless equipment have been made.

The Electric Propulsion of Ships.

A presentation of the conditions under which the propulsion of ships by electricity is economically possible.

By L. F. RATCLIFFE.

THE majority of articles written upon the electric propulsion of ships leave the impression that we are approaching an age when all ships will be electrically propelled.

Investigation reveals, however, that such is very far from true, and, while the electric drive does lend itself to ship propulsion under certain circumstances, its application is confined by economic considerations within well-defined limits.

There are most certainly no signs of the electric drive becoming universal for ship propulsion at present, although plenty of opportunities are available for concerns with sufficient courage to exploit them.

At the present time there are two basic types of ship: (1) steamship, (2) motor ship, and it is difficult for the layman to understand why either of these types should be improved by the additional complication of electrical machinery.

The position is partially explained by the results obtained from research upon the efficiency of ship propellers. As a result of these investigations it was found that the most efficient results were obtained from propellers designed to run at comparatively low speeds. In practice the propeller speeds met with generally lie between 80 and 160 r.p.m. The engineer has therefore to balance the advantages of low-speed engines with direct drive against high-speed engines and a drive through gearing.

The following types of engine are available:—

1. Reciprocating engines.
2. Reciprocating engines and exhaust turbines.
3. Low-speed turbines.
4. High-speed turbines and gearing.
5. Low-speed Diesel engines.
6. High-speed Diesel engines and gearing.

A consideration of the characteristics of these different types of engines indicates that, upon the score of efficiency, size, and weight, the high-speed engine offers a very real advantage over the low-speed engine, even though some form of gearing is required.

The advantage to be gained by being able to fix the speed, independently of both engines and propeller, at a value that suits their requirements with regard to efficiency fully justifies the addition of some form of reduction gearing. If the electrical equivalent of gearing possessed some great advantage in size, weight, efficiency, or operation over mechanical types, then the universal application of the electric drive might reasonably be expected.

Actually, however, the electrical equivalent holds no such advantage over mechanical gearing and, in fact, is higher in first cost in certain cases. The use of the electric drive cannot therefore be justified on these grounds alone, and it is necessary to carry the investigation further to discover additional advantages of the electric drive which justify its use.

At this juncture attention is drawn to the auxiliary power requirements of ships; these may be divided under four headings:—

1. The auxiliary power required by the main engines.
2. The auxiliary power required for domestic, navigational, and safeguard purposes.
3. The auxiliary power required for special care of passengers or cargo.
4. The auxiliary power required for cargo handling.

The modern tendency in passenger vessels is towards higher speeds, greater safety, and more luxurious accommodation, while with cargo vessels we find higher speeds, more efficient cargo-handling devices, and larger refrigerated space for perishable goods. In every direction, therefore, there is a tendency for the auxiliary power requirements to grow. In fact, the last few years have seen a very marked increase in the auxiliary power requirements of ships, as the innovation of yesterday becomes the commonplace of to-day.

The old-fashioned practice of operating auxiliaries by steam was wasteful in the extreme. Even with the much smaller auxiliary power requirements of those days, it was not uncommon for as much as 25 per cent. of the total steam available for the main engines at full power to be absorbed by the auxiliaries.

It can be seen, therefore, that the degree of efficiency obtained in supplying the auxiliary power requirements of a ship could quite easily form the difference of running the ship at a profit and running the ship at a loss. To obtain efficiencies approaching those met with on land, a properly designed auxiliary power system is essential, and by reason of its flexibility no better or more efficient method exists than the use of electricity.

Having established the need for using electricity so far as is possible for the auxiliary power requirements of ships, it can be seen that there will be a ratio of auxiliary power requirements to propulsion power requirements where it will pay to use a properly co-ordinated and designed turbo-electric or Diesel-electric system to deal with the total load. *The electric drive for the propulsion of ships can be fully justified where the auxiliary power requirements are large or varying in character.*

The use of the electric drive can also be justified under certain circumstances by the very high degree of manœuvrability and flexibility that it possesses.

Certain classes of vessels, such as the recently built *Viceroy of India*, operate at varying speeds on different portions of their journey. By the electric drive it is possible to retain the requisite number of engines operating on full load at maximum efficiency and to shut down those that are not required, giving a very much more efficient arrangement than can be obtained with any other form of drive. *The electric drive can therefore be fully justified when a wide range of cruising speeds is required.*

Cross channel services, ferries, and tugs also offer a sphere where in many cases the electric drive can establish its application against all competitors on the score of ease of manœuvring. When a considerable part of the voyage is spent in navigating difficult passages at reduced speed and manœuvring up against the jetty side, as is the case on cross channel service and the like, the greatest advantage is to be obtained by the use of the electric drive.

Summarising the results of this investigation, it will be seen that the electric drive possesses unique advantages for special service or special-duty ships. Its use is indicated:—

1. When the auxiliary power requirements of the ship are large or subject to considerable variation.
2. When a wide range of economic cruising speed is required.
3. When flexibility and ease of manœuvring are specially essential.

So far the characteristics of the electrical drive capable of showing a real economic advantage only have been considered, but there are other advantages, the individual value of which it is difficult to assess, but which

together constitute possibly one of the greatest advancements in ship propulsion of modern times. With the ordinary type of vessel it is very difficult to obtain anything beyond a very approximate figure of the efficiency at which the engines providing the main propulsion or auxiliary load of the ship are working. The figures obtained at trials of so many lb. of fuel per horse-power-hour for all purposes are very difficult to translate into terms of efficiency for each part of the load. The electric drive, however, enables the power output of the generators to be constantly recorded and the power requirements of each individual service of the ship to be checked.

The results can be translated into terms of fuel, and show exactly the cost of the various services performed and their individual efficiency, enabling the whole equipment to be maintained with maximum efficiency. The saving effected from being in a position instantly to locate wastage of power and fuel, and to carry out the necessary adjustments may easily span the margin between profit and loss.

The application of the electric drive enables the power requirements of a ship to be supplied by a system which is initially designed for and can be easily maintained at a high pitch of efficiency. The facility of measurement it provides changes the whole problem of the supply of the power requirements of ships from an art to a highly developed science.

We have now dealt with the characteristics of the electric drive which produce its economic application, and defined the sphere in which it can be usefully employed. While this sphere by no means embraces the whole of shipping, it certainly presents a wide field of activity to the electrical industry.

It remains for the electrical industry to force the pace by putting forward propositions whenever possible, without waiting for the ship builder—who is not naturally electrically minded—to approach it.

The shipbuilding industry of this country is by no means stagnating at the present time; approximately 50 per cent. of British ships afloat are under ten years old. Shipbuilders only need convincing of the advantages of electrical propulsion, where it can be usefully applied, to put it forward.

Electricity for the Home.

An account of the activities of the Manchester Corporation electricity undertaking in supplying and encouraging the use of electricity for domestic purposes

IN line with the most progressive electricity supply undertakings to-day, that of the Manchester Corporation offers inducements to the householder to make the fullest use of electricity for domestic purposes, and the special features of its activities in this connection are an " all-in " tariff, assisted wiring and hire-purchase schemes, simple hire of cookers and washboilers, special showrooms demonstrations, and exhibition work.

The " all-in " tariff consists of an annual fixed charge of 12½ per cent. of the net rateable value of the house, plus one half-penny per kilowatt-hour metered for energy used for lighting and all other purposes. Combined houses and shops, or houses divided into flats, are suitably assessed. Under the assisted wiring scheme the corporation accepts applications from consumers for installations of a minimum of six lighting points, with a two-way switch and a 5-A plug, or of four 15-A heating plugs, and the contracts are let to registered contractors to carry out the work in accordance with a standard specification drawn up by the Electricity Department.

Fig. 1.—" Electric " Houses at Manchester.

Domestic appliances exceeding £3 list price are supplied to consumers in the Manchester area on quarterly payments spread over one, two, three, or five years, according to the value of the appliances, and the scheme is becoming very popular, extending from radiators at a cost of £3 to more expensive apparatus, including suction cleaners and refrigerators. Electric cookers, with each of which is supplied a 3-pint kettle, may be hired at from 5s. to 12s. 6d. per quarter, according to size, the charges including maintenance. This scheme was inaugurated in May, 1923, and 6,546 cookers have now been put into commission. It should be mentioned that, in addition to the hired apparatus, a good many consumers have installed cooking appliances at their own expense. Washboilers may also be hired at from 6s. to 10s. per quarter, according to type, and the maintenance costs are included in these charges also.

The showrooms of the electricity department, although situated in a good shopping area, are more or less of a temporary nature, as the Corporation is carrying out an extensive scheme of enlargement of the Municipal Offices, and arrangements may be made, at a later date, for an establishment more in keeping with the size of the undertaking. Demonstrations of electric cooking, clothes washing, and other uses of electricity are held weekly in the showrooms, and ladies receive special invitations to attend on certain days. As a rule, between 30 and 40 visitors are present on each occasion, and invariably applications for electric cookers are signed at the close of the demonstrations. Arrangements are made for demonstrations of suction cleaners, clothes washers, and other appliances at the homes of consumers, and, in many cases, these demonstrations lead to sales or hire-purchase transactions.

In December, 1926, on one of the Corporation's large housing estates, 58 houses, which had been specially selected, were equipped as " electric," fig. 1, the equipment installed being as follows: electric lighting, plug for iron, washboiler, 15- to 20-A plugs in each of the two larger bedrooms, two 2-kW radiators, and a cooker; the

last mentioned is hired out at the usual charge. The consumption and cost of energy per house for twelve months varied from 708 kWh=£4 4s. 2d. to 4,349 kWh =£12 9s. 3d., according to the number of persons in the house. The average consumption and cost were 1,832 kWh=£7 2s. 11½d. Only four, out of a total of 58, reached a cost figure above £10. In the living room there is a coal firegrate which heats an oven in the kitchenette immediately behind the fireplace, fig. 4. This fire also heats the water for domestic purposes. From personal inquiries made from time to time, the tenants of

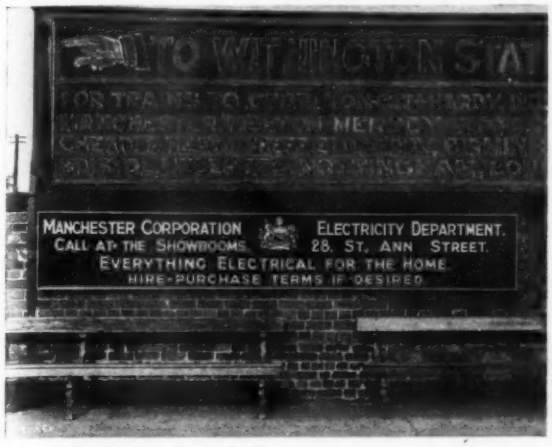

MANCHESTER CORPORATION ELECTRICITY DEPARTMENT.
CALL AT THE SHOWROOMS 28, ST. ANN STREET.
EVERYTHING ELECTRICAL FOR THE HOME.
HIRE-PURCHASE TERMS IF DESIRED

Fig. 2.—Sign on Railway Station Bridge.

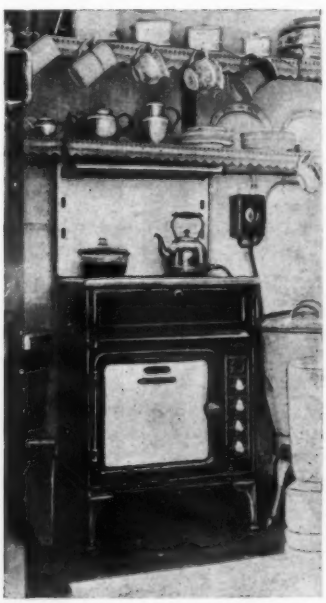
Fig. 3.—E.D.A. Pattern Box Sign.

these houses appear to be quite satisfied with their experience, and there is a decided demand for the "electric" houses. Fig. 5 shows the neat arrangement of an electric cooker and washboiler in an "electric" house in which no gas is used, and in which very rarely is the coal fire brought into operation. There is a growing demand for residential flats in the area, and many large houses are being divided up into sections suitable for this purpose. A typical instance is one of three houses which have been joined up and divided into twelve different flats. A hired electric cooker has been installed in each kitchenette, and radiators and an immersion heater and covered with an asbestos jacket. The immersion heater can be used alternatively or in conjunction with the fire-heated boiler, and it is wired with three-heat control from the scullery. In the adjacent bathroom is depicted an electrically-heated towel rail and a small immersion heater on the stool.

Exhibitions are held in Manchester from time to time, and the Corporation, in conjunction with the Manchester and District E.D.A. Circle, arranges special electrical exhibits, which, as a rule, include cooking, clothes-washing, and water-heating appliances, in addition to radiators and other apparatus for the use of electricity in the home. It is somewhat difficult to estimate business accruing as a direct result of exhibitions, but references are frequently made to a visitor having seen a certain appliance at so-and-so exhibition, which might possibly refer to a show held as far back as two or three years previously.

Manchester, being an industrial centre, affords very little scope for rural electrification, but in April, 1931, a considerable area on the south side of the City will be included within the City boundaries, and there will then probably be developments in this connection.

The British Electrical Development Association adver-



Figs. 4, 5 and 6.—Cooking and Water Heating Equipment in "Electric" Houses.

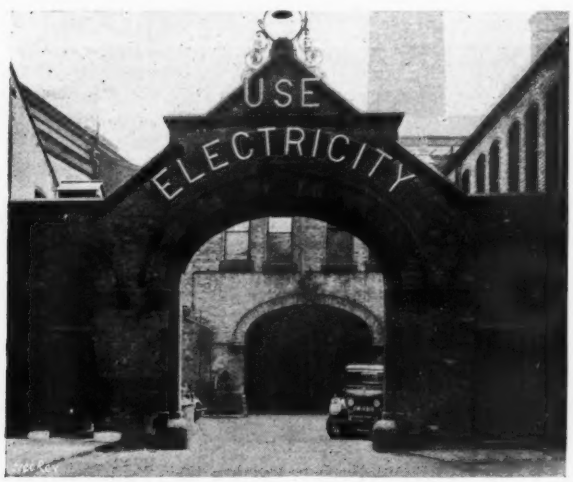
other appliances are being used to a considerable extent.

The illustration, fig. 6, points to another of the undertaking's activities in the domestic field. It shows an ordinary domestic-type hot-water cylinder fitted with

tises the use of electricity in the national Press and popular magazines which have a widespread distribution, and it is left to the local authority to advertise in the local Press. It is found that suburban newspapers, which have a free house-to-house distribution of anything from

5,000 to 20,000, form a useful medium for advertising, and the cost is low compared with results which have been definitely traced to such publicity. Parish magazines, show catalogues, bazaar programmes, and other literature of a kindred nature have also been found to be good means of spreading propaganda at a fairly low cost. During exhibition periods special articles are inserted in the weekly Press, and attention is given to any particular area where building developments are taking place.

Quite a feature is made of sign advertising in Manchester, as the illustrations figs. 2 and 3 and 7 to 10 suggest. Fig. 2 shows a sign fixed on a railway station bridge opposite a tram stop; thousands of people pass this point every day. Figs. 9 and 10 are day and night views of the entrance to Rusholme sub-station, which is equipped with a flashing sign. Similar views of the gateway of the original generating station at Dickinson Street are given in figs. 7 and 8. The sign is composed of gold block letters in metal troughs, and at night it is outlined in red by means of small lamps which throw light on to the red backs of the troughs.



Figs. 7 and 8.—Gateway of Dickinson Street Power Station; Day and Night Views.

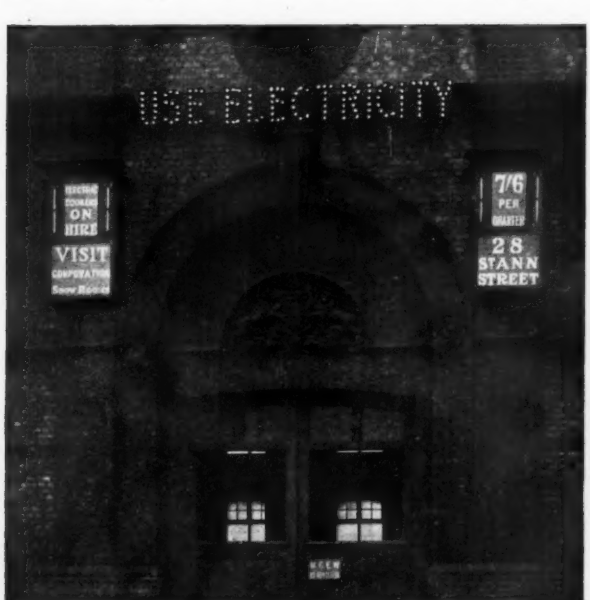
Fig. 3 shows a box sign of the E.D.A. pattern. It is made of sheet metal and is lighted at night by lamps along the top inside.

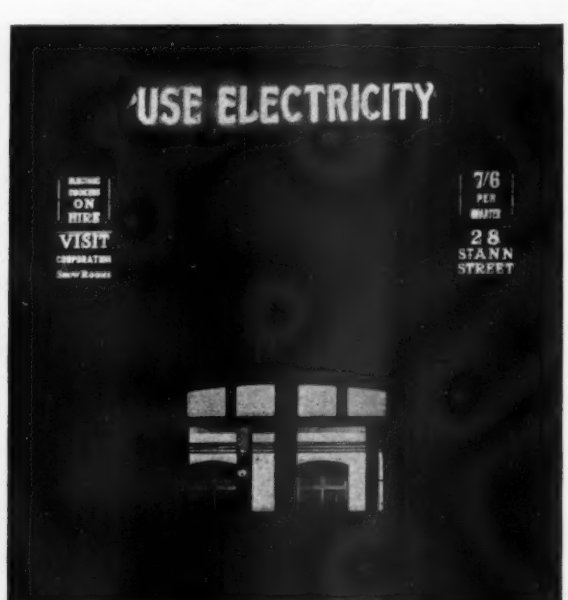
Last winter an interesting film portraying the use of electricity for domestic purposes was exhibited in several of the picture-houses. Another film, which is now being prepared and will be exhibited in various kinema-houses during the forthcoming winter, will depict the generation, distribution, and use of electricity from the generating station to the home.

For the year ended March 31st, 1930, the sales of energy by the undertaking for lighting and domestic uses amounted to 16.82 per cent. of the total sales. The connected load of heating and cooking devices now totals 114,072 kW, which is 26.86 per cent. of the total connections for all purposes. The price of gas in Manchester is 10d. per therm, equivalent to 3s. 9d. per 1,000 cubic feet.

Specially Designed Cooking Utensils.

The importance of perfect contact between electrical hot plates and cooking utensils is receiving increasing attention, and several firms during the past few months have introduced ranges of utensils specially designed with thick and machined flat bottoms to meet the requirements. The most recent additions to the list of firms which have introduced such apparatus are Messrs. Bulpitt & Sons, Ltd., Swansea Works, Birmingham, and Messrs. W. T. French & Son, "Mysto" Works, Browning Street, Ladywood, Birmingham. The range of special utensils by each firm includes kettles, stewpans, steam cookers, and frypans.





Figs. 9 and 10.—Entrance to Rusholme Sub-station; Day and Night Views.

National Radio Exhibition.—I.

Impressions of the show and notes on some of the typically representative receiving instruments and component parts displayed at Olympia.

ANNUALLY described as the biggest organised by the Radio Manufacturers' Association in London, this season's National Radio Exhibition (September 19th to 27th) can be truthfully so termed, for it not only occupies the entire National Hall at Olympia (formerly known as the New Hall, which accommodated the show last year), but also the first floor of the recently-completed New Empire Hall adjoining, the number of stands totalling nearly 400, the display being entirely representative of British industry, the radio section of which is making its full contribution to the solution of the national unemployment problem.

This is an aspect of the Exhibition which is liable to be overlooked. Not only is the radio industry one of the few that have a clean unemployment register so far as skilled labour is concerned, but it has, moreover, been able during the past year to absorb an appreciable percentage of the casual unemployed, and it is providing an important new source of employment for young women, coil winding and the assembly of delicate small components being operations at which girls are specially apt.

Whilst some of the earlier manufacturers who figured prominently at past shows are not represented this year, others have extended their productive facilities, and at least six big new factories have been opened recently in various parts of the country, a total of over 200,000 square feet of new factory floorage having been laid down. Directly and indirectly, the radio industry is estimated to afford employment to nearly a million people, and in the manufacture of an average radio-telephone broadcast receiving instrument the products of at least six other industries are made use of, thus contributing directly to industrial welfare in general. Such evidence of prosperity deserves encouragement as a national asset, since support of the Exhibition should assist manufacturers to maintain the home market against foreign invasion and to increase the export of British apparatus. Let it be hoped that the Exhibition heralds the approach of the most successful radio season so far enjoyed.

The sustained increase of the number of receiving licences issued, which now total 3,162,460 exclusive of the 17,019 issued free to the blind, is indicative of the public's appreciation of the service. Whilst the amateur constructional fever has abated, good-quality kits of factory-made components are available all ready for home assembly, including cabinets, at remarkably reduced prices. Battery-operated sets are also still exhibited, though in a small minority, perhaps the most striking feature of the show being the definite ascendency of the a.c. mains-driven sets; even d.c. battery eliminators seem destined to disappear before very long. This season's sets perfect the last two or three years' improvements rather than introduce any innovations. Control has been definitely simplified, a single spindle knob being now fully adequate, even for three or four tuned circuits; indeed, many modern ganged condensers are thorough engineering jobs and, together with screen-grid high-frequency valves, have done as much for long-distance reception as pentode low-frequency power valves and cone and moving-coil speakers have done for reproductive fidelity. The former are also responsible for the tendency of stationary receivers to become more compact and smaller, in contrast with which transportables and portables seem to be growing in dimensions. Realisation of the limitations of small batteries appears to have stimulated a demand for self-contained mains-driven instruments, which dispense with external aerials and earths, rather than truly portable outfits. Radio-gramophones are becoming more elaborate, even to the extent of automatic record and needle changing.

Regarded as somewhat of the nature of a celebration exhibition marking the tenth anniversary of the first entertainment programme broadcast in this country, the show was appropriately inaugurated "wirelessly" by the Rt. Hon. J. H. Thomas, P.C., M.P., whose speech was radiated on the national wavelength by the British Broadcasting Corporation, which also installed a working amplifier for the Radio Manufacturers' Association to provide the common output for the demonstration rooms and exhibitors' stands, as well as the incidental and dance-hall music, in co-operation with the leading gramophone companies, for the show as a whole by means of some 276 loud-speakers in various parts of the buildings. In contrast with this exhibit, the original 2LO transmitter used at Marconi House is on view, together with a selection of apparatus used in building the regional transmitters, portable line-testing equipment, a variety of microphones, and B.B.C. publications.

Notes on Manufacturers' Displays.

The **Igranic Electric Co., Ltd.**, has staged a large display amongst which are receivers of the "Neutrosonic" seven-valve and short-wave models, and a number of new lines of accessories. Shown for the first time, the "Midget" is a miniature transformer less than 3 by 2 by 2 in. in dimensions which weighs only 6.5 oz. and has a high primary inductance of over 60 henries; a bi-metal core embodying a nickel alloy is used, which does not permit much polarisation. A new type of dual-wave coil is being shown which is very compact and efficient for tuning ranges of 250-550 metres and 1,000-2,000 metres; wave-change is effected by means of a double-pole single-throw switch.

Two additional slow-motion dials have been added, and the Igranic-Elkon metallic rectifiers have undergone complete revision; new sizes with constructional details altered to meet popular demands are now available with a range of mains power transformers for use with accumulator chargers, eliminators, and for exciting the field coils of loud-speakers have been developed in five types designed for anode circuits and four for filament circuits.

A component that will appeal to the radio-gramophone enthusiast is a new switch adaptor; it provides a simple method of connecting the pick-up to the set without alteration of the existing wiring, and by means of a switch incorporated in this useful accessory the change-over from radio to gramophone and *vice versa* can be effected without removing the adaptor from the set.

A new midget switch is self-contained and very compact; having a current-carrying capacity of 1 ampere at 250 volts and 3 amperes at 125 volts, it is supplied with terminal screws and nuts or soldering tags only. A new range of fixed condensers of from 0.1 to 4 μF capacity are so constructed that they are capable of withstanding a much greater voltage than their maximum rating, they being actually tested at approximately three times their normal working voltage before leaving the works. They are suitable for use as smoothing condensers, for shunting the anode circuit of a receiver, or for use in choke-filter output.

Another component which should interest radio-gramophone enthusiasts is a response corrector. By its insertion between

the electrical pick-up and the first valve of the amplifier, this component compensates for the defects inherent in a gramophone record below 200 cycles, attributable to the frequencies below 200 cycles not being recorded at their correct value on the record, solely due to the limit set by the width of the record groove. By the insertion of the response corrector the output from the pick-up is reproduced in its right proportion to the amplifier.

The new "special" pick-up has been designed to respond uniformly to frequencies as low as 50 and as high as 8,000 cycles. This means that all notes in the audible scale which are actually registered on the gramophone record are delivered in their correct proportions to the amplifier with freedom from resonance. Other improvements are: reduction of record wear to a minimum, no sound interference due to needle scratching, or the chatter of bad tracking, and simple needle-changing by inverting the head of the pick-up over the record if desired. Other exhibits include electrically-reproducing equipment, comprising electrically-driven turntables, electrical pick-ups and attendant amplifiers, microphones, power amplifiers, and supply units.

A complete portable microphone amplifier which has been specially designed for deaf people's use is being shown. The complete equipment consists of a three-valve amplifier contained in portable cabinets together with batteries, volume control, necessary switches, microphone and headphones.

The powerful magnetic field and general strength of construction of the Igranic moving-coil loud-speaker are such that when working off large power amplifiers actually 10 watts of modulated power can be handled with complete freedom, yet the sensitivity is such that even with an ordinary two-valve set the reproduction is powerful; it is made in two sizes for 110 and 220 volts a.c.

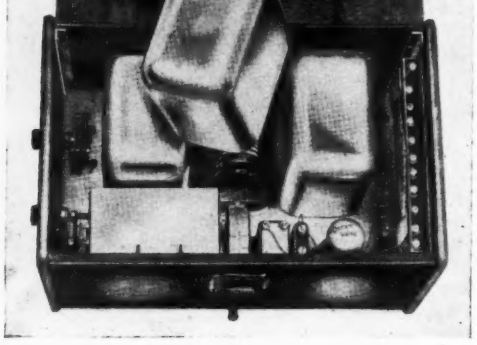


Fig. 1.—"Osram Music Magnet Four."

Fig. 2.—G.E.C. Radio-gramophone.

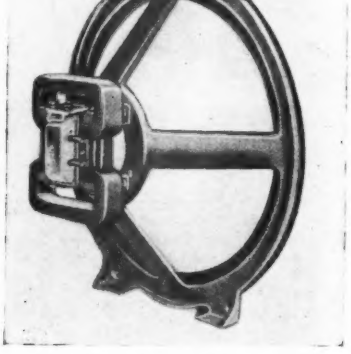


Fig. 3.—"Gecophone" Speaker.

Atalanta, a concern staffed entirely by women, is showing a range of tools of different sorts which it manufactures.

The **Baird Television Co., Ltd.,** has a small stand on which, besides literature, a "Televisor" and a 4-valve a.c. mains-operated radio receiver are on view. It is understood that television is being demonstrated at a temporary showroom outside the exhibition.

The **General Electric Co., Ltd.,** has an imposing array of receiving sets, loud-speakers, and components on one stand, and a separate stand is devoted entirely to "Osram" valves, including several new types. Two new all-electric receivers, designed for operation off a.c. mains, have been added to the "Gecophone" range, one equipped with three and the other with four valves. Prominent also is a radio-gramophone for a.c. mains operation, and considerable interest is invested in the new "Osram Music Magnet 4" set (fig. 1)* incorporating four valves in lieu of the three employed in its predecessor; the ease with which this kit can be assembled is demonstrated on the stand.

The 3- and 4-valve all-electric a.c. mains sets are powerful, having wide ranges with adequate volume and selectivity. The cabinets are neat in appearance and finish, and of small dimensions; provision is made for connecting a gramophone pick-up. The all-electric a.c. mains-operated radio-gramophone (fig. 2) is a handsome instrument. The radio receiver employs two high-frequency screen-grid valves, a power detector, and a ten-watt output valve. The controls are situated in recesses at the sides of the instrument, and are covered when not in use. For reception from local and the more powerful stations, no aerial is required, a non-directional device being incorporated in the cabinet; for reception from more distant stations, a short aerial can be connected. When the mains switch of the instrument is "on," a pilot light indicates that the mains are connected, and illuminates the station indicator in the centre of the front panel. The electrically-equipped gramophone turntable is situated at the top of the instrument, access being obtained by opening the lid; the motor runs silently and at constant speed for all sizes of records. The pick-up has excellent characteristics, giving full value to both low and high notes. A "Gecophone" moving-coil loud-speaker is housed in the lower compartment, and separate volume controls for radio and gramophone reproduction are fitted.

Claimed to be made on new principles, the inductor dynamic model is the latest addition to the range of "Gecophone" loud-speakers. An unusually sensitive and even frequency response, with freedom from chatter, is obtained by a unique arrangement of field magnets and armature suspension. The quality of reproduction and tone resemble those of a moving coil; no field coil system is necessary, and operation is independent of mains supply.

This loud-speaker (fig. 3) is suitable for use with all types of receivers in which a super-power valve is employed in the last stage. It is supplied in chassis form or complete in a handsome polished oak cabinet.

The **Chloride Electrical Storage Co., Ltd.,** displays prominently a comprehensive range of "Gel-Cel" acid accumulators (fig. 4), containing a jellied electrolyte and intended for portable use; the type JWK.7 illustrated is of 29 Ah capacity at the 20-hour discharge rate. An outstanding item is a new unspillable cell having a liquid electrolyte, whilst another new type is the 10-volt heavy-duty anode accumulator cell, which is provided with a very neat lead strip connector that may be easily cut should a shorter link be required.

Falk, Stadelmann & Co., Ltd., have introduced a new model receiver known as the "New Waterloo" (fig. 5), which is intended to be battery-operated with an outdoor aerial. It has screen-grid and pentode valves; the change-over from the short to the long wave bands is effected by a switch, and the set is housed in a mahogany cabinet. Another new model is the "Henley" (fig. 6), which is similar to the above-mentioned set, but is constructed to operate directly off a.c. mains, employing screen-grid h.f. and detector valves with indirectly-heated cathodes and a pentode directly-heated power valve. It incorporates a Westinghouse full-valve rectifier. Other new models include the following portables: "Warwick" transportable five in a polished walnut cabinet; "Epsom" portable 5-valve suitcase type; "Regional Three" portable 3-valve suitcase type, constructed for short waves only; and the "Grenville" radio-gramophone of a suitcase type embodying a 5-valve receiver and Garrard gramophone motor, with 10-in. turntable and pick-up; change-over from radio to gramophone is effected by a switch.

Existing models are being perpetuated, and the range of "Efesca" mains units comprises "Senior" and "Junior" models (fig. 7) for a.c. and d.c. This season's a.c. models incorporates Westinghouse metal rectifiers, full-wave in the case of the "Senior" and half-wave in the case of the "Junior." Also included is an all-power unit for use with a.c. mains valves and trickle charger, both incorporating a Westinghouse metal rectifier. "Puravox 1930" cone speakers comprise two oak models and two mahogany ones that incorporate the patented unit placed on the market last season, but of an improved form, which possesses greater sensitivity, materially increasing its power without sacrificing faithfulness of reproduction.

The **Marconiphone Co., Ltd.,** displays a representative range of products with part of the space devoted especially to Marconi valves. In order that the public may be able to see what is contained inside the glass bulbs, one specimen of each type on show is "ungettered," while a specimen valve is also shown in the various stages of manufacture. In a gallery demonstration room, which has a seating capacity of approximately 50, continuous demonstrations are given of receivers and loud-speakers, in conjunction with the gramo-

* See Elec. Rev., August 1st, 1930, p. 198.

phone pick-up. In addition to current models, which are being continued, new designs exhibited include the Model 220 two-valve all-electric receiver for a.c. mains (fig. 8), which uses indirectly-heated a.c. valves, the circuit comprising a detector and one transformer-coupled l.f. stage. Tuning is by means of a single horizontal thumb control dial. One switch controls medium- and long-wave bands and gramophone pick-up reproduction. Model 221, for battery operation, is similar except that a pentode valve is used in the output stage. Model 560 all-electric self-contained instrument is a fine example of the cabinet maker's craft. The controls are sunk in the top and covered by two sliding panels (fig. 9). Tuning is by one knob only, with an illuminated dial calibrated in wavelengths, that controls matched triple tuning circuits giving a high degree of selectivity. The circuit (2 screen-grid h.f. stages, detector, and pentode) embodies throughout the principle of matched impedance, and for normal use no aerial at all is necessary. Provision is, however, made for the use of an external aerial if desired, while two external speakers may be used either with or without the one incorporated in the instrument. Control of volume, both for radio and gramophone pick-up, is afforded by a small knob above the loud-speaker grille, while a remote volume control is available as an additional accessory. The current consumption is 0.2 amperes at 220 volts, or about 20 hours' running for one kWh of electricity. Model 62 plaque cone speaker has an octagonal mahogany mounting, which allows the speaker either to stand or hang; while Model 63 cabinet cone instrument has a reed movement and matched cone of high sensitivity and capacity for big volume.

The new Marconi PX4 valve should be a boon to owners of standard a.c. receivers and eliminators, and also sets a new standard of volume for users who rely on d.c. supply for their anode circuit. It has, with its 10 watts anode dissipation, brought within the reach of the d.c. user results which formerly were only obtainable with 400 volts on the anode circuit. An amplification factor of 3.5 has been achieved for the low impedance of only 1,050 ohms, giving the very high mutual conductance of 3.3 milliamperes per volt. It has thus a great output, and is ideal for matching with low-impedance loud-speakers. The filament may be operated either from a.c. or d.c., in the former case by means of the same 4-volt a.c. which is applied to the indirectly-heated a.c. valves. At the same time, the reasonable filament consumption (only 0.6 amp. at 4 volts) is well within the capabilities of the average accumulator.

Fig. 4.—" Exide Gel-Cel " Unspillable Battery.

The **Gramophone Co., Ltd.**, announces an important new aid in the solving of service problems for those engaged in the wireless and allied trades. A standard colour code has been introduced into all its instruments, and will also be seen in the Marconiphone instruments at the Exhibition. The colour coding system has been in use in the telephone industry for many years. The colours used will be standard in all instruments; that is to say, a dealer seeing a brown wire in a 1930 instrument will know that a brown wire will identify the same circuit in a 1940 model. The code is being released generally to the wireless and music trades, and will be introduced into all " His Master's Voice " and Marconiphone service manuals from now on.

grid valves render possible a degree of amplification greater than that obtainable with neutralised three-electrode valves; the latter class includes types suitable for use as detectors and low-frequency amplifiers in conjunction with any form of intervalve coupling, and " Pentones " combine an output comparable with that of a three-electrode super-power valve and a very high amplification factor. The range of large output valves has been considerably extended this season to meet the demand for sizes suitable for operating large speakers, public-address equipment, and the like, for operation at anode voltages up to approximately 400 volts; there are, in addition, output pentodes for operating at 300 to 400 anode volts.

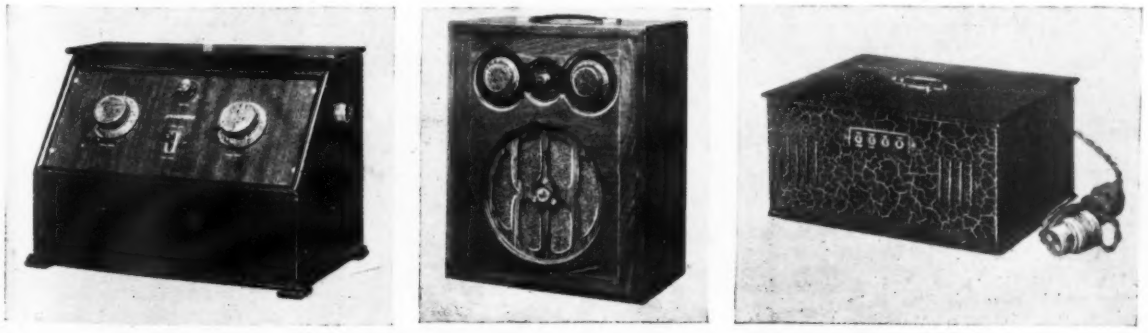
At a time when all-mains operation is rapidly growing in popularity the extended range of a.c. mains valves is of interest; two classes are available, indirectly-heated valves for use in the early stages and directly-heated output valves. The former include two screen-grid types, the S.4VA having the enormous amplification factor of 1,500 and the excellent mutual conductance of 3.5 mA per volt; and three triodes which provide an adequate range of detectors and low-frequency amplifiers. It should be noted that all these indirectly-heated valves are now rated for use at anode voltages up to 200 volts.

Also designed for operation on a 4-volt a.c. filament supply, directly-heated mains output valves have just been introduced by the company; with amplification factors of 10 and 6, they are suitable for anode voltages up to 200 volts. Rectifiers include both full-wave and half-wave types, with outputs from 30 to 120 milliamperes at voltages of 250 and 500, and examples are shown of transmitting and modulating valves of the types which are giving reliable service in ships and shore stations, and special attention is drawn to the display of short-wave transmitting valves.

The well-known " Pure Music " speakers are represented by the type " H " with its 13-in. cone and artistically moulded grille, and similar movements mounted in cabinets, and the " P.M." unit consisting of the balanced-armature movement and a cone of reinforced treated material mounted on a metal chassis ready for mounting on a baffle or incorporation in portable receivers or radio gramophones. The well-designed electro-magnetic unit is of the true balanced-armature type, the armature being poised between four magnetic poles. The methods of anchoring the armature by flat springs at each end and of connecting the driving rod to the cone diaphragm render lateral movement impossible. In the larger types tappings are provided whereby impedances of 1,600, 1,100, or 500 ohms can be selected to suit the output circuit of the set, while the speech coil will carry with safety a maximum current of 25 milliamperes and can therefore be connected directly in the anode circuit of a super-power valve.

Chief among the company's smaller components is the " Permacore " low-frequency transformer in which a core of special high permeability alloy, a primary winding of a silver alloy wire, and a secondary winding of nickel wire combine to produce compact dimensions, low weight, and good performance.

For providing 4-volt supply for operating a.c. mains valves, the P.M. filament transformer has a maximum output of 5



Figs. 5, 6, and 7.—" Efesca " Receivers and Anode Battery Eliminator.

The **Mullard Wireless Service Co., Ltd.**, in addition to a gallery demonstration room, has separate stands on which its publications and receivers, speakers, valves, and accessories are displayed. The exhibit is designed to indicate that the company's products have kept pace with recent developments in technique. For use as high-frequency amplifiers, screen-

amperes, thus permitting as many as five valves to be operated from one transformer. Other components are paper-dielectric condensers for working voltages up to 250 volts, mica-dielectric condensers, constant-value grid leaks, and compact wire-wound resistances. The new issue of " Radio for the Million " contains full constructional details, working drawings, and

blue prints of two modern receivers. The accompanying letterpress is profusely illustrated with photographs and the instructions are so clear that a novice cannot fail to assemble and wire a set with accuracy.

The **Westinghouse Brake and Saxby Signal Co., Ltd.,** shows a selection of dry copper-oxide rectifiers of various sizes. To the constructors' units have been added three new high-voltage units of an entirely new design, which have been produced with the object of providing metal rectifiers at the lowest possible cost consistent with satisfactory service; they will be available on October 1st. Unlike the original models which were cased in heavy-gauge sheet-metal with cellulose enamel, with substantial bakelite mouldings and two B.A. terminals, &c., the new ones are enclosed in a lighter-gauge metal case with four B.A. terminals. The rectifying units themselves are also of slightly different construction and, while being equally reliable, are not of such high electrical efficiency, but it will of course be appreciated that this point is of minor importance so far as radio apparatus is concerned, involving merely a slightly greater a.c. input voltage for a given d.c. output. All the three new units are designed to give either half-wave rectification or for use with the full-wave voltage-doubler circuit. Arrangements are being made with manufacturers for transformers suitable for use with these units to be available. The company is also showing its larger units for service-station battery charging, including the popular R.G.C.1 model with four independent circuits.

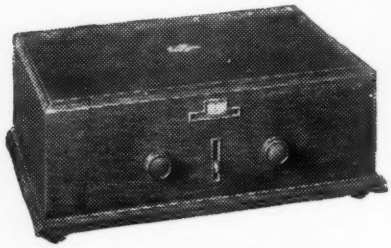


Fig. 8.—New Marconi 2-Valve Receiver.

Fig. 9.—Marconi 4-Valve Screen-grid Set.

The **Dubilier Condenser Co. (1925), Ltd.,** is exhibiting a compact two-valve a.c. mains-driven receiver and a.c. mains-operated motor-driven radio-gramophones, 2-, 3-, and 4-valve models, the walnut pedestal cabinets of which house the loud-speakers. Components include varied types of condensers and resistances, many of which should be of considerable interest to the electrical industry in general, especially the company's power-factor correction equipment as used in radio stations and industrial plant; the set on view is of 80 kW capacity, 440 V, 3-phase, complete with switchgear.

The **Henderson Wireless and Electrical Service** (wholesale only) exhibits include an interesting gramophone motor. In the first place it is suitable for d.c. and a.c. (at frequencies of from 40 to 100 cycles) operation without any modification whatever, which is a feature of value from the trade stocking point of view and from that of the user who moves from one district to another. While the gramophone is in operation the turntable is driven by clockwork mechanism. Therefore, its factors state, when used with an amplified gramophone "there is no possibility of pick-up as the machine is fitted with an automatic stop that comes into operation at the end of the record and makes contact on the tone-arm, so connecting a solenoid which throws a trip and stops the turntable," at the same time making connection with the mains current for winding up the clockwork whilst the record is being changed. So soon as the machine is fully wound, or immediately the turntable is restarted, the electric motor is switched off. It is understood that the equipment is of British origin and manufacture (Auto Electric Devices, Ltd.).

Messrs. E. K. Cole, Ltd., one of the firms which have recently built new factories*, are this year exhibiting two- and three-valve a.c. and d.c. mains-operated receivers of very compact design and have recently marketed loud-speakers also of the balanced-armature and moving-coil types. Naturally, battery eliminators of a large variety of patterns, including accumulator trickler chargers, are prominent on the stand, several new models being noted; Westinghouse metal rectifiers are employed throughout and the necessity for altering existing receiver wiring and valves is obviated. The eliminators are metal cased, while the receivers are housed in moulded bakelite cabinets symmetrical with those of the speakers, as is shown in fig. 10, which depicts the 3-valve set (screen-grid, detector and pentode) on top of the speaker. The sets are calibrated in wavelengths, no aerial being needed for local reception, and gramophone pick-up plug sockets are provided.

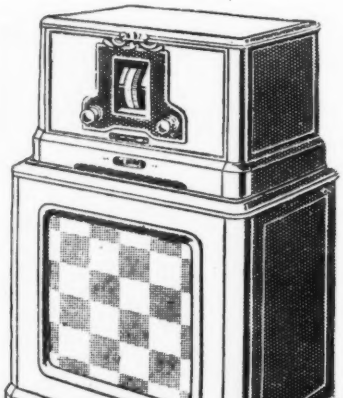


Fig. 10.—"Ekco" Set and Speaker.

Radio Instruments, Ltd., whose recently-completed new factory and latest 4-valve "Madrigal" receiving set have already been referred to,† are too well known to need introduction. Besides a selection of efficient components, such as chokes, transformers, &c., mains-operated d.c. and a.c. receivers are on view, the newest being illustrated in fig. 11. The handsome cabinets enclose intelligently-designed assemblies of excellent all-round performance, external earth and aerial being unnecessary for normal operation.

The latest 3-valve "Madrigal" employs the new a.c. indirectly-heated pentode "Mazda" valve which enables the output of the receiver to be increased, as the voltage of the anode has been raised to 220 V by an increase in the size of the transformers and chokes. In addition, an extra "Hypercore" nickel-iron choke has been added to the smoothing circuit and a centre-tapped choke is used in place of the output transformer formerly employed. The new model is also fitted for a gramophone pick-up, a novel feature being the use of the same volume control for radio and gramophone reproduction; the change-over is effected by a special switch at the back of the instrument. A further improvement is the calibration of the single tuning dial of the instrument in wavelengths, two scales being used, one for the medium waves and one for the long waves; the dial is also illuminated by a small bulb fed from the transformer.

The "R.I." battery eliminators are claimed to be the first to employ nickel-iron chokes for the smoothing circuit, their high permeability enabling the choke to be reduced in size and weight. The coil of such a choke can be wound with a much smaller number of copper turns, thereby reducing the self capacity and the d.c. resistance. The two latter features help to prevent high-frequency currents getting into the l.f. side; the lower d.c. resistance reduces the fall of potential and also gives a minimum common impedance effect. The a.c. model employs the latest type of Westinghouse dry rectifier, so that no valves or replacements are necessary. The whole of the parts are built into a bakelite moulding to imitate walnut, and the connections are fitted in recesses so that no live parts are flush with the case and cannot, therefore, be accidentally touched. The output of both a.c. and d.c. units is 60-80 volts for a screen-grid valve, 150 volts for the detector valve, and 140 volts at 20 milliamperes for the power valve, or the same load from the detector if connected to the power valve. Suitable ventilation louvres are moulded into the case to ensure correct working temperature. Two tappings are available for connecting the correct supply voltage, 200-225 volts and 225-250 volts at 40-100 cycles. The weight of the a.c. model (fig. 12) is only 5¼ lb., while the d.c. model

Fig. 11.—"Madrigal" 3-valve Receiver.

* See ELEC. REV. July 18th, 1930, p. 119.

† See ELEC. REV. August 29th, 1930, p. 331.

weighs 3½ lb., and both are designed to fit into any portable receiver in the space provided for the standard 100-volt dry battery. The units conform in every way to the Institution of Electrical Engineers' requirements.

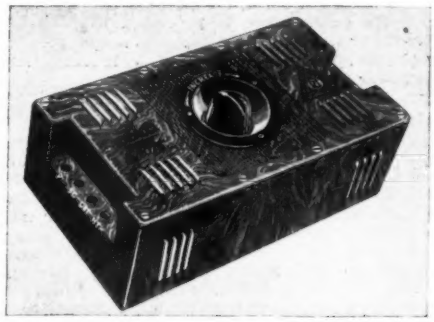


Fig. 12.—The " R.I." Anode-battery Eliminator.

Ferranti, Ltd., receivers attract attention; of uncommon appearance, the five models consist of a handsome console, 3-valve metal and wood sets, and 2-valve metal sets of the dual-wave regional type specially tuned ready for switching to one or other of the local stations. First-class radio meters and components include a new a.c. transformer and new fixed condensers, while dynamic speakers of a.c., d.c., and permanent-magnet types are available in chassis and cabinet forms. The d.c. model is rated at 23 watts, and the a.c. 35-watt speaker is marketed as a self-contained unit in which are incorporated a full-wave rectifier for energising the field magnet winding and a tapped-primary transformer for adaptation to mains voltage and frequency. An external transformer is necessary to couple the speaker to the receiver's output valve. The smallness of the diaphragm diameter, only 6 inches, seems to be responsible for the extraordinarily good high-frequency response: the middle register is uniform, and the bass is free from objectionable " boom." Sensitivity appears to be of the same order as that of the average moving-coil instrument, and its performance as a whole places this speaker decidedly amongst the best available commercially at present.

The metal-cased receivers are covered with coloured leather, which enhances their appearance, notwithstanding their unconventional shapes. Of modest overall dimensions, they are easy to operate and should appeal to the discriminating user of well-made apparatus.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

Overseas Trade Organisation.

The desires and intentions of the Department of Overseas Trade to render assistance to our manufacturers, formed the theme of an address by Mr. G. M. Gillett, Parliamentary Secretary of the Department, at a meeting of the Incorporated Secretaries' Association at Oxford last week. In the reckless flourishing of the Parliamentary axe a few years ago there was evidence of such drastic designs on the Department that it was obvious that the value of the service that it had been rendering was not understood. Happily the false economy movement was strongly resisted by the business community, including this REVIEW. There is nothing particularly pleasant in being able to say " I told you so " when it relates to neglected opportunities of increasing trade and employment, but the Department is at last doing some of the things which were strongly advocated here years ago and which probably would have been bearing good fruit to-day if the organisation had been regarded as a business-getting Department and a thoroughly justifiable national investment. Mr. Gillett has been trying to secure opportunities for it to render legitimate overseas trade-getting assistance to our people, and in his speech at Oxford (as reported in *The Times*), he said that in the past an inadequate staff had made it impossible for its information to be as complete as he would have liked it to be; but with the appointment of more overseas officers and a strengthening of the home service he was hopeful of the Department affording far greater service to industry in the future than it had done in the past. We devoutly hope this will be the case. One of its difficulties is to get the business world to know what help it is able and willing to give. It is surprising to learn that its information is used to a greater extent by the larger firms than by the small. We do not know whether this criticism was intended to be general, but we can hardly credit it that the smaller electrical firms fail to use the D.O.T. information that is placed before them week by week in the pages of the ELECTRICAL REVIEW. We mention the point, however, so that our smaller firms may investigate the suggestion for themselves. They may not only stand to gain increased trade but they have it in their power to encourage officials to go on and do still better things on their behalf. Mr. Gillett went on to mention the work that was being contributed by the various economic and other missions. He also touched upon the work being done by special investigators, by which we presume he meant such inquiries as have been made in different European countries regarding the position and prospects of particular trades (domestic electric appliances, contractors' supplies, &c.) and the reasons why our traders should be more actively engaged there. Having urged such specialised inquiries on so many occasions we welcome reports of this character such as are now coming to hand. We fully believe that if the electrical trade will co-operate with the Department, the Department will increasingly assist our industry.

Sir E. Petter and the Tariff Truce.

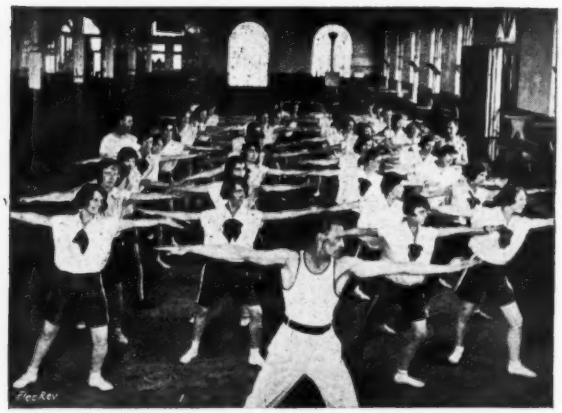
Sir Ernest Petter, chairman of Petters, Ltd., last week informed the President of the Board of Trade of his decision to resign from the Advisory Council to the Board on account of the promise made at Geneva by Mr. Graham that the " Tariff Truce " would be ratified by Great Britain. Sir Ernest considered that such action would be " suicidal " in the face of existing unfair conditions which permitted the unrestricted dumping of foreign goods into this country while there was such a large body of unemployed. He believed that only strong retaliative measures would relieve the present situation and a tariff truce would preclude any action of this character. In reply, Mr. Graham pointed out that the Advisory Council was formed to ensure that the President of the Board of Trade for the time being should receive regular authoritative information regarding the condition and prospects of trade and commerce. The members had always been selected without reference to their political or general views. He maintained that the suggestions regarding the effects of a tariff truce were based on a misapprehension of the nature and objects of the Convention. To this Sir Ernest Petter replied that differences of political opinion had not deterred him from rendering his best services to the Advisory Council during the time that Mr. Graham had been President of the Board of Trade. The effect of the undertaking given by Mr. Graham that Great Britain would ratify the Tariff Truce was of such a grave character, having regard to the present state of industry and unemployment in this country, as, in his opinion, to raise the issue above party politics.

New Municipal Showrooms.

The Clitheroe Town Council on September 10th opened showroom premises in King Street for the display and demonstration of electrical appliances for the home and workshop.

Welfare at a Standard Telephone Factory.

The welfare schemes of electrical companies play an important part in maintaining the efficiency of their organisations, and in addition to providing healthy working conditions for employés, opportunities for open air recreation and proper attention in cases of illness or accidents, physical culture is encouraged. An interesting example of the last method of maintaining health and efficiency is seen in the accompanying



Physical Culture at Standard Telephone Works.

illustration, which shows how some of the female employés at the North Woolwich factory of Standard Telephones and Cables, Ltd., keep fit.

Electrical Progress in Russia.

Russian newspapers state that the work of electrification is making further progress; a sum of 452 million roubles has been assigned for the construction of regional stations or 50 per cent. more than last year. In 1929, it is said, thirty regional stations were built, and stations representing a capacity of 1,600,000 kW were in course of construction, while 47 stations are now in hand representing a total of 3,500,000 kW. A representative of the Energy Centre stated at a meeting of the State Planning Commission on September 9th, that during the nine months ended with June this year the programme of electrification was only completed to the extent of 47.8 per cent. as compared with a normal 60 to 65 per cent., and for the ten months by 53 per cent.; it was expected that the scheme would be carried out to 75 per cent. by the end of September. The reasons for the non-fulfilment of the programme are:—Defects in management which delay the work of reorganisation; bad preparations for the constructional season; and the non-provision of adequate staff, materials, and equipment. At the beginning of the season there were insufficient workmen available, and with an unsatisfactory supply of food products, &c., the situation became worse. An acute scarcity of workers took place at the Dnieper works, in Nischni-Novgorod, and in all the Ural region, but matters were worse in regard to the technical staff. Constructional activity was impossible at many works owing to the lack of materials. It is estimated that during this year new stations of a total capacity of 410,000 kW will be brought into operation as compared with 452,000 kW which had been expected. The shortage of supply will be felt in a year or two in Moscow and Leningrad, while in other districts, especially in the Donetz coal basin, almost a crisis is anticipated. As a result of the reduction in the importation of plant the share of work allotted to Soviet manufacturing works has considerably increased, but the Soviet works are not prepared to cope with it.

A technical committee composed of representatives of the National Commissariat of Railways and the Supreme Council of National Economy was appointed some time ago to suggest practical measures for the reconstruction of the railways. The committee has now put forward large development plans both in regard to steam and electric traction. The electric traction estimates show that the committee finds that the transport requirements under the five years' plan, which will end in the year 1932-33, are represented by 250 electric locomotives and 200 motor units. In the following five years it is estimated by the committee that 4,000 electric goods locomotives, 800 electric passenger locomotives, and 300 motor units will be required. It is proposed that the Podolsk works shall specialise in the construction of electric locomotives and the mechanical parts of the trains.

Employment during August.

The September *Ministry of Labour Gazette* reports that employment in the engineering industry continued bad during August and showed a further decline affecting all sections and nearly all areas. In electrical engineering employment remained moderate though declining. The total number of unemployed in the engineering industry as a whole rose to 175,772 representing an increase from 16.0 to 17.5 per cent. In the electrical section the number of unemployed increased to 7,621, *i.e.*, from 8.4 to 9.0 per cent. There was also a rise in unemployment in the electric cable, wire, and lamp group —from 9.3 to 10.2 per cent., the number of unemployed being 9,612. On the other hand, there was a slight improvement in the electrical wiring and contracting industry in which the number of unemployed declined to 2,063, reducing the proportion from 12.5 to 12.4 per cent.

The Building Trades Exhibition.

The biennial Building Trades Exhibition was opened at Olympia, on September 17th, and will continue until next Wednesday. Since its inception thirty-five years ago when the exhibitors numbered only eighty-seven, this exhibition has steadily increased in size until this year there are nearly four hundred stands occupied. Of the electrical exhibits a very large number are devoted to the display of the machinery, plant, and tools for use in wood-working; concrete-mixing machines are also very prominent. All sizes and types of lifts and cranes are well represented, as well as a good selection of builders' hoists and conveyors. Electric pumping plant and oil engines are also shown, and there is a good display of electrical tools for all purposes. Several stands contain examples of equipment for paint spraying, while one interesting exhibit consists of electric grinding machines for use in the milling and mixing of paints or inks. In addition to the foregoing apparatus and equipment connected with the structural side of the building industry, there are several exhibits dealing with domestic electrical installation and decorative work. Besides a good display of modern electric lighting fittings, electric fires, and tubular heaters, there are many examples of the ways in which electricity can be made to serve the housewife in the carrying out of her household duties. There are both clothes-washing and dish-washing machines, not to mention numerous exhibits of refrigerating apparatus. On one stand a special feature is made of a coloured kitchen suite comprising a kitchen cabinet for storing groceries and cooking requirements, into which a loud-speaker has been incorporated; an electrical refrigerator is supplied in colour to match.

Among the companies exhibiting apparatus of an electrical character are the following:—Frigidaire, Ltd.; Flextol Engineering Co., Ltd.; Berry's Insulating and Building Products, Ltd., L. G. Hawkins & Co., Ltd.; K.F.M. Engineering Co., Ltd.; Kango Co., Ltd.; Lacy Hulbert & Co., Ltd.; Marco Refrigerators (1929), Ltd.; Troughton & Young, Ltd.; and Young, Osmond & Young, Ltd.

The French Market for Electrical Goods.

A confidential report on the market for electrical contractors' supplies in France has been prepared by the Department of Overseas Trade from information furnished by H.M. Consular Officers in various parts of France, and issued to firms whose names are entered on its Special Register. United Kingdom firms desirous of receiving a copy of this report should communicate with the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1, quoting Reference No. A.X. 10199.

Electric Lamp Publicity.

We have received from Messrs. Tungsram Electric Lamp Works (Gt. Britain), Ltd., of 72, Oxford Street, London, W.,

A Tungsram Window Display.

some examples of their new publicity literature for the 1930-31 season. These comprise an eight-colour showcard designed by a well-known artist, and this design also forms the basis of the company's window displays. There is a small counter leaflet and a large display price list advertising motor lamps, while the same product has been handled in a brilliant six-colour poster 30 in. by 20 in.

Proposed Canadian Tariff Revision.

According to the *Board of Trade Journal* the proposed alterations in the Canadian Customs tariff affect, *inter alia*, the following classes of goods: Electric light fixtures and appliances, n.o.p., and complete parts; electric head, side and tail lights; electric torches or flashlights; electric arc lamps and incandescent electric lamps n.o.p.; these will all be subject to a duty of 20 per cent. *ad valorem* under the British preferential tariff. The following will be subject to a 25 per cent. duty: Electric dynamos, generators, transformers and motors, n.o.p., and complete parts thereof. It should be noted that under the Tariff Act, where the British preferential rate exceeds 15 per cent. *ad valorem*, a rebate of 10 per cent. of the amount of the duty is granted.

The Buenos Aires Subways.

The Times reports the decision of the Anglo-Argentine Tramways Co., Ltd., to proceed with the construction of the second of the three subways in Buenos Aires for which it holds concessions. This work has been held up on account of the refusal of the Municipality to allow the company to institute a 15-cent fare for the existing 10-cent fare which is said to be unremunerative. It is assumed that the company's decision renders valueless the concession recently awarded to a Spanish group (*vide* Electrical Review, September 5th, (p. 400).

United States Electrical Exports.

Exports of electrical machinery and equipment from the United States during June last had a value of $10,873,318, representing a decrease of $676,817 as compared with June, 1929. The principal declines occurred in the following classes:—Batteries, from $828,948 to $640,776; electric motors, from $742,566 to $657,333; accessories and parts for motors, from $208,841 to $157,799; d.c. generators, from $274,015 to $74,707; therapeutic and X-ray apparatus, from $168,532 to $88,632; radio apparatus, from $1,684,211 to $1,365,984; and insulated copper wire and cable, from $538,758 to $440,907. The greatest increases were shown against transforming and converting apparatus, from $442,897 to $605,936; and telephone apparatus, from $383,107 to $848,981. The trade for the first half of the current year shows a slight gain—from $70,314,999 to $71,149,598. Canada maintained her position as the principal customer for United States electrical goods, taking a share valued at $2,504,055; Argentina ($917,128) was second and Russia ($731,980) third. Other leading importers were the United Kingdom ($701,843), Brazil ($521,057) and Mexico ($519,165). The United States' imports of electrical goods during June were valued at only $313,906; Great Britain supplied radio and telegraph apparatus.

New French Companies.

Among the companies recently formed in France are La Société Hydro-Electrique de la Durance (Anciens Etablissements Pavie et ses Fils), Paris, capital £40,000; La Société Radio Bramly, Paris (14, Rue Lacretelle), £120,000; and La Société des Forces Motrices du Plateau Central, Paris (20 Rue d'Athenes), £80,000.

E.D.A.-E.L.M.A. Shop and Display Lighting Campaign.

The British Electrical Development Association has prepared a variety of literature in connection with the Shop and Display Lighting Campaign, which it is circulating to some 200,000 shopkeepers. This includes a broadsheet entitled "People stop at the well lighted shop," and a booklet showing how profits can be obtained from well lighted shop windows. With the literature is forwarded a reply postcard for further information regarding shop lighting, &c.

With a view to securing a good national press for the objects of the campaign, Press luncheons are being organised in London and the provincial areas, and will take place on October 6th. The luncheon for the London and Home Counties area will be held at the Connaught Rooms, Great Queen Street, W.C. Tickets, price 6s. 6d., can be obtained on application to the Director, E.D.A., 15, Savoy Street, W.C.2.

The Mission to the Far East.

The Economic Mission which is proceeding to the Far East left Tilbury on Friday last on board the *Macedonia*. Japan will be reached on October 30th and the members will stay there for four weeks or thereabouts, afterwards proceeding to China. The arrival at Shanghai is timed for November 29th. Sir Ernest Thompson is chairman of the Mission and of the Cotton Sub-Mission. Lt.-Col. R. K. Morcom is a member of the Mission, the object of which is to inquire into the present position of British trade with China and Japan, and to find ways for improving it if possible. Though cotton and woollen industries may be bulking largely in the mind of the members, the engineering and iron and steel industries are represented, as they are of considerable importance in connection with Chinese trade. An interesting interview with Sir E. Thompson appeared in *The Times* on September 20th, in the course of which Sir Ernest said that they were going to ascertain whether we were going wrong, in what respects we were failing to meet the requirements of these large markets, why we had lost the predominant position, and what steps could be taken to recover some of the trade which we had lost.

Bankruptcy Proceedings.

A. E. Matthewman, motor and wireless engineer, 6, Wednesday Market, Beverley.—Trustee, Mr. W. B. Hall, National Provincial Bank Chambers, Silver Street, Hull, appointed September 15th.

W. H. Quintrell, electrical and mechanical engineer, Higher East Street, St. Colomb Major, Cornwall.—Last day for receiving proofs for dividend, October 7th. Trustee, Mr. C. Handcock, 12, Princes Street, Truro, Official Receiver.

H. A. Atack, electrician and wireless accessories dealer, 442, Borough Road, Birkenhead.—First and final dividend of 9½d. in the £, payable on September 29th at the offices of the Official Receiver, Government Buildings, Victoria Street, Liverpool.

R. Smith and D. A. Smith (D. A. Smith & Co.), wholesale wireless dealers, 41, Skerton Road, Old Trafford, Manchester.—First meeting held September 25th at the Official Receiver's offices, Byrom Street, Manchester. Public examination, November 20th at the Court House, Encombe Place, Salford.

T. C. Cottrell, electrician, 31, Autumn Street, Burley Lodge Road, Leeds.—Last day for receiving proofs for dividend, October 2nd. Trustee, Mr. H. C. Bowling, 24, Lower Bond Street, Leeds, Official Receiver.

F. H. Graham, electrician, 14, Hilltop Avenue, Harehills, Leeds.—Last day for receiving proofs for dividend, October 2nd. Trustee, Mr. H. C. Bowling, 24, Lower Bond Street, Leeds, Official Receiver.

Company Liquidations.

Electromobile, Ltd., Otley, Yorks.—A meeting of the creditors was held on September 11th at the Hotel Metropole, Leeds. The statement of affairs presented showed ranking liabilities of £4,606 and net assets of £2,357. The company was formed twelve years ago with a capital of £16,645, and there was a deficiency so far as the shareholders were concerned of £18,894. The chief cause of the failure appears to have been heavy overhead charges for productive and unproductive labour. According to a balance sheet at January 1st, 1929, there was a surplus of assets over liabilities of £392, but since then there had been a net loss of £3,757, and this, together with the depreciation written off the assets accounted for the deficiency now existing. The creditors decided to confirm the appointment of Mr. R. E. Starkie, Leeds, as liquidator, together with a committee of inspection consisting of the representatives of five of the principal creditors.

Artandia, Ltd., 18, Pittshead Mews, Park Lane, W.—Under the winding up order made against the above company, which was formed to acquire patents in relation to sound-producing and amplifying apparatus and to carry on business as manufacturers of loud-speakers, gramophones, &c., the statement of affairs shows total liabilities of £5,593, of which £1,947 rank for dividends and assets, £3,414 being absorbed by debenture-holders' claims. The following are creditors:—

	£		£
Andia, Ltd.	45	Morgan Bros. & Co. ...	21
Goode & Co. (London), Ltd.	1,216	Marquis de Andia Yrarrazaval	100

Faradex-Seraphone Co., Ltd.—This company was formed in April, 1929, to acquire the business of manufacturers of portable and mains wireless receivers and also a business of manufacturers of wireless sets and gramophones. Under the compulsory winding up order made in July the statement of affairs filed shows total liabilities £12,892, all but £100 being unsecured, assets of £2,007, and a total deficiency as regards shareholders of £54,992. The following are the principal creditors:—

	£		£
J. H. Dormer	187	New Broad Street Trust, Ltd.	350
Lord Glenarthur	262	Roy Hardy, Ltd.	6,699
A. S. V. Llewellyn ...	1,800	E. E. Rooke	1,312
Mackinnon Cole-Hamilton & Dunley	1,500	R. Schooley & Sons ...	128
		R. H. Welstead	187

Hough Bros., Ltd.—A meeting of members will be held at Friary Chambers, Friar Lane, Nottingham, on October 22nd, to hear an account of the winding up of the company by the liquidator, Mr. W. L. Dominy.

Enterprise Manufacturing Co., Ltd.—Particulars of claims by October 31st to the liquidator, Mr. P. Leask, 27-28, Finsbury Square, E.C.2.

Sphinx Electric, Ltd.—First meetings of creditors and contributories will be held on September 30th at Bankruptcy Buildings (Room 53), Carey Street, Lincoln's Inn, W.C.2.

New Catalogues and Lists.

Carron Company, Carron, Falkirk.—The first of a series of pamphlets entitled "Famous Men and Carron Works," containing biographical notes of famous engineeers connected with the early history of the company. The present pamphlet is devoted to John Smeaton, who joined the company in 1760.

British B.A.G., Ltd., 23, Farringdon Avenue, E.C.4.—An illustrated leaflet of watertight diffusing electric light fittings

for bathrooms, &c., and a blue print showing a curve of light distribution for "B.A.G." fittings with 100-watt lamps.

HOLOPHANE, LTD., Elverton Street, Vincent Square, S.W.—Catalogue No. 200, giving illustrations, particulars and prices of "Pagoda" prismatic lighting fittings.

WILD-BARFIELD ELECTRIC FURNACES, LTD., Elecfurn Works, North Road, Holloway, N.7.—A catalogue of high temperature furnaces including furnaces arranged for the accurate maintenance and close control of temperatures up to 1,400 deg. C.

CROMPTON PARKINSON, LTD., Guiseley, Leeds.—Specification No. A.505, of kiosk type sub-stations. Illustrated.

SUN ELECTRICAL CO., LTD., 118 and 120, Charing Cross Road, W.C.2.—Preliminary section of the company's radio catalogue, dealing with receiving sets, radio gramophones, and loud-speakers. Illustrated and priced.

FERRANTI, LTD., Hollinwood, Lancs.—Publications Nos. W.522 and Wa.522/1, containing, respectively, illustrated descriptions of the construction of supply units for radio receivers, and Ferranti mains components.

EVER-READY CO. (GREAT BRITAIN), LTD., Hercules Place, Holloway, N.7.—Illustrated catalogues giving particulars and prices of "Ever-Ready" batteries, accumulators, torches, and lamps.

L. E. WILSON & CO., LTD., Hudson's Court, Corporation Street, Manchester.—A pamphlet describing an aural staff locator.

FORMO COMPANY (ARTHUR PREEN & CO., LTD.), Crown Works, Cricklewood, London, N.W.2.—A new catalogue of radio components.

S. SCHNEIDER, 3, Hanover Court, Moor Lane, London, E.C.2.—A leaflet giving a description of the new "De Luxe Mary Ann" vacuum cleaner.

S. WOLF & CO., LTD., 115, Southwark Street, Blackfriars Bridge, London, S.E.1.—List W132a, illustrating a new range of electric soldering irons and solder-melting pots.

THOMAS A. ROSE & SON, LTD., 25, Milton Street, London, E.C.2.—A 1930-31 catalogue of electrical instruments, batteries, flash lamps, electro-medical apparatus, bakelite material, radio accessories and novelties.

GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.—Catalogues D (1) and H (2), dealing, respectively, with electric household and industrial appliances.

MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, W.1.—"The Marconiphone Mail" with literature giving particulars of the company's new distribution scheme and programme for 1930. Also a small poster stamp of the Marconi dealer sign for affixing to correspondence and orders.

YOUNG, OSMOND & YOUNG, LTD., 47, Victoria Street, Westminster, S.W.1.—A folder, illustrated in colour, dealing with "Utility" tubular electric skirting heaters, with a revised list of prices.

MOULDED PRODUCTS, LTD., Chester Road, Tyburn, Birmingham.—A folder illustrating in colour the company's electric table lamps.

G.K.S. COMBUSTION CO., LTD., 11, St. Mary-at-Hill, E.C.3.—A brochure illustrating furnace equipment and chemical plant.

PHILIPS LAMPS, LTD., 145, Charing Cross Road, W.C.2.—An illustrated and descriptive catalogue of all-electric radio receivers, radio-gramophones, battery eliminators, rectifying valves, &c. Priced.

FALK, STADELMANN & CO., LTD., 83 to 93, Farringdon Road, E.C.1.—Catalogue No. 632 of "Efescaphone" receiving sets, "Efesca" mains units, "Puravox" loud-speakers, &c. Illustrated and priced.

A.E.G. ELECTRIC CO., LTD., 131, Victoria Street, S.W.1.—A pamphlet describing hotel prepayment meter type "Sh." Illustrated.

THE ENFIELD CABLE WORKS, LTD., Lincoln House, 296-302, High Holborn, London, W.C.1.—Catalogue NTL No. 10 (replacing NTL No. 9) of v.i.r. wires and cables.

WALKER BROS., LTD., Quality House, Temple Row, Birmingham.—The October issue of the *Walker Bros. Electrical News*, containing articles on electric water heating, power plugs, cooking, and lighting fittings.

CLARMAC ENGINEERING CO., LTD., 48, Payne Street, Port Dundas, Glasgow.—Publication No. C2 containing illustrated particulars of "Clarmac" switchboards.

MIDLAND ELECTRIC MANUFACTURING CO., LTD., Birmingham.—Particulars of a new 5-amp., two-way distribution fuse called the "Duette."

BULPITT & SONS, LTD., Swansea Works, Birmingham.—The September catalogue of electrical cooking utensils.

BRITISH INSULATED CABLES, LTD., Prescot, Lancs.—Booklet H.123 (replacing H.105), dealing with the "Helsby" ebonite enclosed wiring system, and leaflets P.F.72 and 73 describing, respectively, the "Gemmell" cable suspender and the "Helsby Bulldog" black adhesive tape. Also List No. P254 dealing with asbestos insulated wires and cables.

EDISON SWAN ELECTRIC CO., LTD., 123-5, Queen Victoria Street, London, E.C.4.—Folders C.L.511 and 578 on "Mazdalux" and "X-Ray" reflectors, respectively.

REVO ELECTRIC CO., LTD., Britannia Works, Tividale, Tipton, Staffs.—A new switch- and fusegear catalogue (S.11), including details of the 5-10 amp. Home Office pattern distribution fuseboards and the Revo control panels. Many of the prices have been considerably reduced.

WOLF & MORGAN, LTD., 66, Victoria Street, London, S.W.1.—The mid-September stock list of Wagner and R.W.M. motors.

W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, London, E.C.1.—Booklet No. 22, containing the new net prices of cables and wires based on the revised discounts which came into force on September 11th.

JOHNSON & PHILLIPS, LTD., Charlton, S.E.7.—Leaflets Nos. T.C.1, O.L.M./1, and P.B.J.1, describing, respectively, the company's trailing cables, bird guards for overhead lines, and P.B.J. wires and cables.

Trade Announcements.

Messrs. J. H. TUCKER & CO., LTD., of Birmingham, announce that as from Monday next, September 29th, their London office, trade counter, and showrooms, will be transferred to 22/23, D'Arblay Street, W.1. Their telephone numbers and telegraphic address remain unaltered. Expansion of business in the London and Home Counties has rendered the accommodation in Dean Street inadequate—hence the change.

The London office of the WARDLE ENGINEERING CO., LTD., has been removed to larger premises, at 34, Victoria Street, S.W.1. The telephone number (Victoria 4072) is unaltered, and Mr. H. Gunner remains in charge.

The head office and sales department of the LEA RECORDER CO., LTD., has been removed to Recorder House, Cornbrook Park Road, Manchester (telephone number: Trafford Park 2077)

AUTOCAR ELECTRICAL EQUIPMENT CO., LTD., have removed to 32, 33 and 34, Albert Embankment, S.E.

On September 22nd, Messrs. M. F. FARRAR & CO., electric lighting, heating, and power engineers, of Halifax, opened extensive new showrooms at 12-14a, Crossley Street.

Mr. LEONARD KENT, electrical and radio engineer, has opened new showroom premises at 104, High Street, Broadstairs.

Book Notices.

"Edison and His Storage Battery," by W. H. Meadowcroft (24 pp.).—This little monograph gives a history of the development of the alkaline storage battery, and proves the truth of the inventor's dictum regarding the proportions of "inspiration" and "perspiration" which enter into the development of a genius. Edison made more than 10,000 experiments before he obtained any preliminary results whatever, and these were followed by a further 40,000. An appendix to the booklet sets out briefly Edison's remarkable career, and demonstrates the versatility and fertility of his brain. The publication can be obtained gratis from the New Distributors of Edison Storage Batteries, Ltd., Victoria House, Southampton Row, W.C.1.

"Pitman's Electrical Educator." Edited by Sir Ambrose Fleming, M.A., D.Sc. London: Sir I. Pitman & Sons, Ltd. Price 1s. 3d. each part. Sir Ambrose Fleming is again the editor of this publication in its new and revised edition, now being issued in fortnightly parts. This interesting and practical work has not only been revised and enlarged, but the sections have been re-arranged in a form which will be found of great convenience for reference, and will also facilitate the reading of the work. Part I is dated October 4th.

Schlomann-Oldenbourg Illustrated Technical Dictionaries.—The volume on "Aeronautics" (editor, Mr. Alfred Schlomann) has been recently or is about to be published by Messrs. Lewenz & Wilkinson, Ltd., 25, Victoria Street, S.W.1. The price until October 31st is 21s., including postage. Sixteen volumes of these dictionaries, covering many branches of engineering, have now been published.

"Applied Mathematics for Engineers," by T. Hodgson. Vol. I, pp. vii+183; figs. 226. Price 9s. 6d. net. Vol. II, pp. vii+293. Price 13s. 6d. net. London: Chapman & Hall.

"The Theory and Design of Illuminating Engineering Equipment," by L. B. W. Jolley, J. M. Waldram, and G. H. Wilson. Pp. xxxi+709; figs. 555. London: Chapman & Hall. Price 45s. net.

"The Elementary Principles of Wireless Telegraphy and Telephony," by R. D. Bangay. Pp. xii+268; figs. 299. London: Iliffe & Sons, Ltd. Price 10s. 6d. net.

"Handbook of Technical Instruction for Wireless Telegraphists," by H. M. Dowsett. Pp. xix+487; figs. 459. London: Iliffe & Sons, Ltd. Price 25s. net.

"Converting a Business into a Private Company," by Herbert W. Jordan. Pp. 50. London: Jordan & Sons, Ltd. Price 1s. 6d. net.

"Siemens-Jahrbuck, 1930," compiled by the Siemens and Halske A.G. and the Siemens-Schuckertwerke A.G. Pp. 562; illustrated. Berlin: V. D. I. Verlag G.m.b.H. Price, Mk. 12.

Lists Wanted.

The ALLEN-WRIGHT ELECTRIC CO., of 132, Bramhall Lane, Davenport, Stockport, wishes to receive manufacturers' price lists of electrical and wireless goods.

Recent Contracts.

The *Financial Times* reports that Messrs. ARMSTRONG, WHITWORTH & CO., LTD., have secured a contract from the Buenos Aires Great Southern Railway Co. for three Diesel-electric locomotives.

It is also reported that Messrs. C. A. PARSONS & CO., LTD., are to supply 12 turbines for the new Cunard liner which is to be built on Clydeside.

Dundee and Foreign Cable.

Dundee Corporation Electricity Committee on September 15th again discussed the question of Foreign *v.* British cable. The convener stated that the cheapest contracts for cables during the current month were from Belgian, French, and German firms at an aggregate of £3,538, against £3,997 by British firms—a difference of 13 per cent. He also pointed out that the lowest-priced British offers were from a firm outside the "combine." The Lord Provost moved that they accept the British offer. On a vote it was agreed to accept the lowest offers.

New Luxemburg Company.

A new company has been formed in Luxemburg with a capital of £40,000 and the title La Société Holding Électrique Franco-Orientale (Elecorient) to finance electricity undertakings in Eastern Europe.

Italian Lamp Production.

The production of electric lamps in Italy during March last amounted to 2,093,969, bringing up the total for the first three months of the year to 6,129,731, as compared with 5,464,259 in the corresponding period of the preceding year.

New Italian Companies.

Among the companies recently formed in Italy are the Societa Radco Volta, Rome, with a capital of 228,000 lire; La Societa Pila Accumulatrice, Milan; and La Societa Elettrica Ing. Canessa ("S.E.I.C."), Voltri, Genoa, with a capital of 3,000,000 lire.

The Birmingham Electric Club.

The opening meeting of this Club for the 1930-31 session takes place to-night at 7 o'clock at the Grand Hotel, Colmore Row, Birmingham, with a paper on "Electrically-driven Rolling Mills," by Mr. H. S. Carnegie. Other events in the programme are: October 17th, ladies' night; October 24th, "Pros and Cons of Factory Electrical Equipment," by Mr. R. H. Rawll; November 21st, "Power Factor Correcting Machines: Commutating Type," by Mr. H. Dreghorn; January 23rd, 1931, presidential address; February 27th, "Electricity Supply Metering and Methods of Charge," by Mr. W. Lawson; March 13th, annual dinner; March 27th, "An Outline of the Work and Organisation of the Post Office Engineering Department," by Mr. J. Coxen. Mr. J. H. Asdell is the hon. secretary.

Local Exhibition.

The County of London Electric Supply Co., Ltd., is holding an electrical exhibition at the Wandsworth Town Hall from October 7th to 11th inclusive.

Busy Battery Makers.

The D.P. BATTERY CO., LTD., of Bakewell, reports good business. Orders to the value of well over £10,000 have been received during the past month for batteries for power stations alone; but their chief development is in the increasing use of Kathanode batteries for trucks, locomotives, public service and other heavy vehicles at home and abroad. Present orders include four of these large batteries for standard gauge locomotives in India, truck batteries for the Post Office, four for heavy mining locomotives, and standard vehicle batteries for Ilford, Croydon, Nottingham, Sheffield, and Manchester.

Selling Talks.

Miss Gladys Burlton (The Burlton Institute, 30, Manchester Street, Manchester Square, London, W.1), has sent us a number of leaflets giving brief particulars of her arrangements for talks to buyers and managers on staff training.

Prices of Materials.

Messrs. Edward Till & Co. report, September 23rd:—India-rubber, Para fine: 5¾d. (¾d. dec.).

Messrs. James & Shakespeare report, September 23rd:—Copper bars (best selected), sheet and rod: £77 (£2 dec.). English pig lead: £19 5s. (5s. dec.).

Messrs. F. Smith & Co. report, September 23rd: Copper (electrolytic) bars, £50 (£2 2s. 6d. dec.); ditto, ditto, sheets, no change; ditto, ditto, wire rods, £60 (£2 2s. 6d. dec.); h.c. wire, 7¾d. (¼d. dec.); silicium bronze wire, no change.

Messrs. James Forster & Co., reporting on September 20th, stated that the lead market opened unchanged last week, but subsequently a little outside selling, apparently from America, was seen, and with the Producer's Association unwilling to support, prices fell away 12s. 6d. per ton. Later the market was strongly supported by producers' interests which had the effect of steadying prices at the lower level. This steadiness is probably temporary; when producers have to buy their own commodity to keep up the price, the position, on the face of it, must be extremely unsound.

Unemployment.

There was an increase of 79,127 in the number of registered unemployed during the week ended September 8th. The total on that date was 2,139,571, as compared with 2,060,444 on September 1st, and 1,149,692 on September 9th, 1929.

Lighting and Power Notes.

Argentina.—SANTA FÉ.—The Municipality of Santa Fé has arranged to dispose of its power station and generating plant as a going concern to the Compania Argentina de Tranvias y Fuerza, Limitada, a concern backed by foreign capital. It is proposed to supply the town entirely from the up-to-date power station, of British construction, owned by the Compania Argentina, the capacity of which will be increased. The purchasing company has agreed to reduce the charges for electricity.—*Reuter's Trade Service* (Santa Fé).

Aylesbury.—EXTENSIONS.—The Town Council has decided to give a supply of electricity by underground mains to an additional 100 houses at California. As an unemployment scheme mains are to be extended to Bledlow, Longwick, Brill to Doddershall, Wotton Moreton, Bishopstone and Chinnor, at an estimated cost of £4,740.

TARIFF REVISIONS.—The following revised tariff has been adopted in the borough as from October 1st. Private dwelling houses: 1d. per kWh for all purposes, with standard charges according to the outside base area of houses. Domestic water heating: ¾d. per kWh. Slot meters: 9d. per kWh for lighting, and 1½d. for other domestic uses. Lighting, small power, &c., for shops, business and combined premises: 1½d. per kWh; a demand indicator will be fixed to measure the total demand for lighting, and for each 25 watts demand a charge of 8s. per annum will be made. In combined premises where electricity is used for cooking, &c., the charge for this purpose will be 1d. per kWh. A corresponding scale of charges for the extended area of supply will come into operation as from November 15th.

Barking.—SUPPLY TO HOUSING ESTATE.—At a recent meeting of the Urban District Council Electricity Committee, a letter was received from the London County Council requesting that the necessary arrangements should be made for the supply of electricity to another section of the Becontree estate which is about to be developed. The electrical engineer was asked to prepare the necessary plans and estimates for submission to the Electricity Commissioners.

Barrow-in-Furness.—EXTENSIONS.—The Corporation has received sanction to supply electricity to Broughton-in-Furness; to erect overhead lines between Dalton and Broughton, with a branch line from Wall End to Kirkby slate quarries; and to borrow £7,586 for mains and sub-station equipment.

Belgian Congo.—ELECTRICAL DEVELOPMENT.—According to the *Manchester Guardian Commercial*, the Société Générale Africaine d'Electricité, a new Belgian company, proposes to spend £450,000 on constructing power plants and operating concessions for the supply of electricity in Elizabethville and Panda-Likasi.

Brighton.—PROPOSED SUPPLY FOR TELSCOMBE.—The Corporation Electricity Committee recommends that an overhead line be erected to give an electricity supply to Telscombe and that sanction to a loan of £1,500 be applied for to cover the cost.

Canada.—HYDRO-ELECTRICAL DEVELOPMENT.—Plans have been filed at Papineauville, Quebec, by the James Maclaren Co., Ltd., of Buckingham, for the construction of a large hydro-electric installation capable of developing 120,000 h.p. The plant will be erected near the mouth of the Lievre river, a Quebec tributary of the Ottawa. The company has already constructed a plant at High Falls on the Lievre to develop 90,000 h.p.—*Reuter's Trade Service* (Ottawa).

THE ST. LAWRENCE SCHEMES.—Mr. Bennett, the Prime Minister, replying to a communication from the United States inquiring if the Canadian Government is ready to proceed with further negotiations for international power development and the deepening of the channels of the St. Lawrence waterway, has replied that the matter will be taken up on his return from the Imperial Conference.—*Reuter* (Ottawa).

China.—HYDRO-ELECTRICAL DEVELOPMENT.—According to the *Chinese Economic Bulletin*, the National Reconstruction Commission is making plans for the construction of two electric power works, one at Sanhsien on the Yangtsze River and the other at Lungmen on the Yellow River, so as to utilise the large water-power resources of these two rivers. The Commission is also endeavouring to collect records and data concerning the rise and fall of the various large rivers in the country so as to determine on the building of electric power works at other suitable points.

Continental.—FRANCE.—Figures published recently by the Ministère des Travaux Publics show that on January 1st, 1927, hydro-electric power had been developed in France to the extent of 3,767,809 kW. During 1927 this figure was increased by 257,550 kW, and on January 1st, 1929, installations in hand amounted to 321,390 kW, making a grand total of 4,346,749 kW. This total is said to be more than half of the amount of hydro-electric power available in France. Various projected schemes bring the total to 5 million kW, leaving only about 3 million kW available for exploitation.

ITALY.—The Italian Government has recently authorised the Societa Generale Italiana Edison di Elettricita, of Novara, to proceed with the erection of a 130,000-V transmission line between the Verampio power station at Crodo

and the Caradese-Magenta transmission line. The Societa Terni per l'Industria e l'Elettricita is also about to erect a 150,000-V line between the Galleto power station at Terni and the Pescara station at Alanno.

SWITZERLAND.—As from October 1st next Government control of electric power stations in Switzerland will pass into the hands of a new department known as the Amt für Elektrizitätswirthschaft, in Berne. The new office will deal with all questions of electric power supply development in the country, applications for electricity "import" and "export" permits, and will also be responsible for the compilation of all statistics relative to the capacity of Swiss power plant and production, &c.

Crowborough.—STREET LIGHTING.—The Parish Council has decided to adopt electricity for street lighting instead of gas. The supply will be given by the Weald Electricity Supply Co., Ltd.

Dundee.—POWER STATION EQUIPMENT.—The Corporation Electricity Committee is to spend £960 on additional switchgear at the Carolina Port generating station, and £265 on a portable oil purifier.

Glasgow.—PROGRESS DURING AUGUST.—Under the Corporation Electricity Department's scheme 612 houses were wired in August making the total to date 25,150, while additions to hired appliances numbered 38, bringing the total to 19,889.

MAINS EXTENSIONS.—The Electricity Committee recommends the laying of distributing mains at a cost of £1,545.

Halifax.—PRICE REDUCTION.—The Corporation Electricity Committee recommends the reduction of the "unit" charge of the domestic two-part tariff from ¾d. to ½d., as from the December meter readings. The change will involve a concession to consumers of approximately £9,000. There will also be a *pro rata* reduction in the sliding scale at present in operation.

Hampton.—STREET LIGHTING.—The Urban District Council is to consider a report with regard to the cost of lighting the streets by electricity as compared with gas.

Hove.—YEAR'S WORKING.—The report of Mr. C. Bottomley Smith, borough electrical engineer and manager, on the working of the electricity undertaking for the year ended March 31st last records a total revenue of £73,839, a working expenditure of £47,258, and a gross profit of £26,581. The figures for the preceding year were: Income, £76,340; working expenses, £42,628; gross profit, £33,712. After providing for capital and other charges, there was a net deficit of £4,290, as compared with a net profit of £7,745 in 1928-29. This deficit, which has been charged to the reserve fund, was not unexpected and was due entirely to reductions in charges made during the year. Expenditure on capital account during the year amounted to £18,799, of which £14,242 was for mains and services. The total now spent on the undertaking stands at £433,933. The sales of electricity showed a substantial increase from 5,269,734 to 6,474,752 kWh, the maximum demand rising from 3,300 to 3,900 kW. The average price obtained per kWh fell from 3.33d. to 2.65d. The number of consumers connected at the end of the year was 9,315, an increase of 965.

Irlam.—ELECTRICITY SCHEME APPROVED.—The Electricity Commissioners have approved a scheme submitted by the Urban District Council, in conjunction with the Stretford and District Electricity Board, for the supply of electricity to the district.

Japan.—NEW STATION COMPLETED.—The I.G.R.'s new steam power station at Tokyo is expected to be running at full capacity by the end of this month. The station, which comprises two 25,000-kW generators, will supply all the power at present required for the railway.

Keighley.—OVERHEAD LINE EXTENSIONS.—The Corporation Electricity Committee recommends the Town Council to approve the extension of overhead lines from Laycock to Eastburn, to link up with the existing system from Keighley to Sutton, so as to provide an alternative supply to the latter district, from which complaints have lately been made of inadequate service. Sutton till now has been dependent on a single line, and the Keighley Corporation does not regard the income from Sutton sufficient to justify an entire duplicate line throughout.

Lancaster.—PROPOSED EXTENSION OF SUPPLY AREA.—The Town Council has applied to the Rural District Council for consent to an Order to supply electricity to Slyne-with-Hest, Bolton-le-Sands, and Scotforth. The Rural District Council has deferred its decision. Pending a Special Order being granted a Fringe Order will be obtained.

London.—SHOREDITCH.—The Borough Council Electricity Committee recommends the expenditure of £15,000 for mains and services and £20,000 for meters. It is also proposed to provide a feeder main, with switchgear and metering equipment, at a cost of £1,800, in connection with a bulk supply to the London and North-Eastern Railway Company.

ISLINGTON.—*Year's Working.*—We have received from Mr. A. P. MacAlister, borough electrical engineer, a copy of the accounts of the Electricity Department covering the year ended March 31st last. The total revenue from the undertaking showed an increase from £232,190 to £251,032, while the working expenditure amounted to £127,674, as compared with £127,288 in the preceding year. The gross profit rose from £104,902 to £123,358. After making provision for interest on loans (£23,023), income tax (£5,756), repayment of loans (£41,880), contribution to capital account (£3,763), and sundry other items, there was a net surplus of £49,344, as compared with £32,625 in the previous year. During the year the capital expenditure amounted to £54,661, which brought the total spent on the undertaking at March 31st up to £1,341,566. Sales of electricity increased from 27,978,076 to 31,995,742 kWh and the maximum load from 20,438 to 20,295 kVA.

The Electricity Committee is to extend mains, at a cost of £20,000, as a means of relieving unemployment.

ST. PANCRAS.—The Borough Council Electricity and Public Lighting Committee recommends that application be made to the Unemployment Grants Committee for a grant in connection with a scheme estimated to cost £6,965 for the conversion of 170 gas lamps to electricity. The Committee also recommends the laying of mains at an estimated cost of £1,128.

FULHAM.—The Borough Council Electricity and Lighting Committee recommends the expenditure of £2,706, to be spent over three years, on street lighting improvements. Sanction has been received to loans of £5,313 for sub-stations and equipment at North End House and Rivermead Court and £13,256 for h.p. mains in the West Kensington and Hurlingham districts.

HAMMERSMITH.—The Borough Council has received sanction to the borrowing of £29,814 for services, £4,263 for plant, and £13,680 on account of the application for £110,026 in respect of the scheme for the extension of the main transmission and distribution systems. The Electricity Committee proposes that the existing pressures of supply throughout the borough be changed to the standard and that application be made for sanction to the borrowing of £10,000 on account of the carrying out of the work. The total cost of the work is estimated at £200,000. It is also proposed to apply for sanction to a loan of £1,212 for the provision of a new e.h.p. sub-station on the London Midland and Scottish Railway embankment at Hythe Road.

Luton.—MAINS EXTENSIONS.—Subject to a grant by the Unemployment Grants Committee, the Town Council has decided to extend its mains to Caddington, Markyate, Kensworth and Stopsley, with a feeder in Bute Street, at a total cost of £18,212, for which a loan is to be applied for.

New Zealand.—THE ARAPUNI HYDRO-ELECTRIC SCHEME.—The report of the Swedish expert, Professor Hornell, regarding the Arapuni hydro-electric scheme is now in the hands of the Government. It is understood that the professor does not condemn the scheme, which has proved somewhat disappointing mainly owing to the abnormal lack of rainfall in the Lake Coleridge watershed.—*Reuter* (Wellington).

North Lincolnshire.—SPECIAL ORDER AMENDMENT.—Application has been made to the Electricity Commissioners by the Yorkshire Electric Power Company (*a*) to combine the draft Special Orders under the titles of the Yorkshire Electric Power Eastern Extension and Isle of Axholme and District Electricity Special Orders, (*b*) to add to the areas already included in the Orders certain parts of Lindsey, Lincolnshire, and (*c*) to exclude various parishes in the rural district of Beverley.

Northern Ireland.—BELFAST.—The Town Council has applied for sanction to the borrowing of £99,120 for boilerhouse extensions.

Oldham.—THE COTTON MILL TARIFF.—In consequence of the depression in trade having caused the consumption of electrical energy in a number of cotton mills to fall very considerably, the Corporation Electricity Committee has decided that, as a temporary measure, consumers of energy who have entered into agreements for supplies at the cotton mill tariff and who are at present consuming less than 15,000 kWh per month, shall be charged at the rate of 1d. per kWh.

ELECTRICITY SUPPLY.—The Electricity Committee has made an agreement with Messrs. T. Wilde & Co., Ltd., for the supply of electrical energy for power purposes to the Caledonian Mill.

LOAN SANCTIONED.—The Corporation Electricity Committee has obtained sanction to the borrowing of £50,000 for mains.

MARKET HALL HEATING SCHEME.—At a recent meeting of the Corporation Markets Committee, it was reported that the borough electrical engineer was preparing a scheme for heating the market hall by electricity.

Peterborough.—SUPPLY TO YAXLEY.—The Corporation Electricity Committee has consented to supply electricity to Yaxley by overhead cables on condition that electricity is used for street lighting. The Parish Council has agreed to the proposal.

Portland.—LOAN SANCTIONED.—The Urban District Council has received sanction to a loan of £10,634 for electricity purposes.

Southend-on-Sea.—REVISED TARIFFS.—The Town Council has adopted the following new scale of charges: Lighting flat rate: 5½d. per kWh. Contract rate: £21 per kW of demand per annum, payable in advance. Supply for heating and domestic appliances: 2d. per kWh. Water heating: ½d. per kWh, with 8s. per annum meter rent. Contract rate: £8 10s. per annum for the first kW of maximum demand, and then £8 per kW, with a minimum demand of ½ kW, and meter rent of £1 per annum. Domestic "all-in" tariff: 20 per cent. of the rateable value, plus 1d. per kWh in the winter, and ¾d. per kWh in the summer. Business "all-in" tariff: £6 net per half year per kW of installed lighting, plus 1d. per kWh in winter, and ¾d. per

kWh in summer. Industrial heating: 1d. per kWh in the winter and ¾d. per kWh in the summer, with a fixed charge of £4 per annum. Power: 3d. per kWh for the first 1,000 kWh per quarter; beyond, 2½d. per kWh. Two-part tariff: £3 10s. per half year per kW of maximum demand (d.c. supplies), or £3 net per kVA of maximum demand (a.c. supplies), plus ½d. per kWh net (average charge not to exceed 3d. per kWh). Restricted hour tariff: 1½d. per kWh (no supply to be taken between 4 p.m. and 10 p.m. during winter), plus a fixed charge of £5 10s. per annum. Except where the charges are net, accounts will be subject to a discount of 5 per cent. for prompt payment.

LOANS.—The Town Council has applied for sanction to loans of £12,000 for house service mains, £2,434 excess expenditure on mains for linking up the generating stations, and £1,004 expenditure in connection with the installation of plant at the Leigh sub-station.

Stretton-on-Dunsmore.—ELECTRICITY SUPPLY.—A supply is to be given to the village next spring by the Leicestershire and Warwickshire Electric Power Co.

Swansea.—PLANT EXTENSIONS.—The Corporation Electricity Committee is to install an additional transformer and switchgear in the Manselton sub-station, at an estimated cost of £692; replace the existing transformer and install additional feeder cable and switchgear at the Glanmor sub-station, at an estimated cost of £1,722; replace existing kiosk and transformer at Ynysforgan, at an estimated cost of £275; and erect a kiosk and install a transformer and e.h.p. main at Clydach, at an estimated cost of £1,527.

BULK SUPPLIES.—The Corporation Electricity Committee has decided to give a bulk supply of electricity to the Swansea Vale works of the National Smelting Co., Ltd., at an estimated cost of £835, and to the premises of the Northcliffe Newspapers, Ltd., at an estimated cost of £1,035.

Taunton.—DOMESTIC APPARATUS.—The Town Council has applied for sanction to a loan of £3,000 for the purchase of domestic apparatus by the electricity undertaking.

Tilbury.—LOAN.—The Urban District Council has applied for sanction to a loan of £8,983 to cover excess expenditure in connection with the electricity scheme.

Venezuela.—ELECTRICAL DEVELOPMENT.—A fairly complete report on central electric power stations in Venezuela in 1929 shows a total of approximately 25,000 h.p., of which 12,764 h.p was Diesel-engine operated, 6,235 h.p. Diesel and water power, 2,769 h.p. water power alone, 2,500 h.p. water power and steam, 250 h.p. producer gas, and 150 h.p. steam. The Caracas Electric Light Co. uses the rapids of the Guaira River at El Encantado for the generation of 1,050 h.p., and another plant at Los Naranjos, two miles higher up the river, furnishes 1,500 h.p. Power sites also are reported at the Atures Rapids of Guahtaribo, 120 miles above Esmeraldas on the upper Orinoco.

West Kent.—ALTERNATIVE TARIFFS.—The West Kent Electric Co., Ltd., has recently adopted two alternative tariffs. One is for lighting, heating, cooking, and all domestic purposes in private houses, and consists of a standing charge based on the dimensions of the premises, plus 1½d. per kWh. The second is for business premises, and is based on a standing charge of 7s. 6d. per quarter per 100 watts of installed lighting capacity, plus 1½d. per kWh.

Tramway and Railway Notes.

Aberdeen.—YEAR'S WORKING.—In his annual report on the working of the City Tramways Department for the year ended May 31st last, Mr. J. L. Gunn, the general manager, states that the total revenue from the trams (£16,637) again constituted a record, the preceding year's figure being £161,965. Working expenses amounted to £134,691, as against £131,542, and there was a gross profit of £32,946 (£30,423), to which was added £5,780, interest on investments and an unemployment grant, making a total of £38,726 available. Interest on loans absorbed £7,362, a contribution to the depreciation and renewal account £15,065, sinking fund £4,251, and income tax £4,563. There remained a net surplus of £7,483, as compared with £6,377 in 1928-29. The capital expenditure during the year was only £1,636; the total expenditure on the undertaking now amounts to £658,307. Passengers carried totalled 42,968,027, as against 41,584,677, while the car mileage increased from 2,807,796 to 2,892,538. The average receipts per car mile amounted to 13.81d., as compared with 13.74d.

Colwyn Bay.—TRAMWAY ABANDONMENT.—The tramway service from the centre of the town to the eastern terminus at Old Colwyn was discontinued last Saturday.

Continental.—FRANCE.—According to the report of the general meeting of the Cie. des Chemins de Fer du Midi, 1,036 km. of lines are now worked electrically. These lines are: Toulouse-Dax; Toulouse-Tour de Carol, with branches to Montréjeau and Luchon; Tarbes-Bagnères de Bigorre; Lourdes-Pierrefitte; Pau-Canfranc; Buzy-Laruns; Bordeaux-Irun, with branches to Arcachon and Biarritz; Perpignan-Villefranche de Conflent and its extension to Tour de Carol. The electrification work now in hand includes the lines Béziers-Neussargues, which is expected to be completed by October, 1931; Puyoo to Mauléon and Saint Palais; and Bayonne-Saint Jean Pied de Port, which is expected to be put into operation by the end of the current year. The lines for which conversion to electric traction is projected are: Bordeaux-Pointe de Grave, to be completed by 1932 ready for the new port which is being constructed at Verdon at the mouth of the Gironde, and from Montauban to Cette on the Mediterranean coast. The completion of all this work will bring the total length of line operated electrically to 1,852 km. out of the 4,246 km. belonging to the Cie. du Midi.

A scheme for the installation of electrically-operated signals on all the French railways has been approved by the Ministry of Public Works. The work, which will occupy five years beginning in 1931, is estimated to cost something between £400,000 and £800,000. The new signals will be of the day-and-night luminous type with the three-colour system in use on some lines in Great Britain.—*Reuter* (Paris).

GREECE.—The first section of a new underground electric railway in Athens has recently been completed and opened for traffic. The line, which is 1¼ miles in length, has been built by German contractors after the style of the underground railways in Berlin and Hamburg.

Darlington.—RAILLESS-CAR EXTENSIONS.—The Corporation Electricity and Transport Committee recommends the Town Council to apply for a provisional Order to extend the railless-car routes to the new boundaries of the borough.

Halifax.—YEAR'S WORKING.—After four years of financial loss the Corporation Tramways Department made a profit of £370 for the year ended March 31st last. The cumulative loss for the preceding four years had been £38,638, or an average of £9,672 per year. A revision of the tramway fares is stated to be responsible for last year's favourable result.

Japan.—RAILWAY EXTENSIONS.—The Hanwa (Osaka-Wakayama) Electric Railway Co. has received sanction to extend its line for about 10 miles from Kii to Konakawa.

London.—THE KINGSWAY TRAMWAY TUNNEL.—*The Times* states that the enlarged Kingsway tramway tunnel between the Victoria Embankment and Southampton Row is expected to be ready for reopening before Christmas, some weeks before the time specified in the contract. The original subway had room for single-deck tramcars only. As reconstructed it will permit of the passage of the higher, double-decked cars.

Manchester.—TUBE RAILWAY PLANS.—The Corporation Underground Railway Committee, the *Daily Dispatch* understands, is to meet shortly to discuss the scheme for underground railways for Manchester and district, and it is expected that the railway companies will be invited to attend a conference. It is understood that the plans will include provision for extensions of the system to other Lancashire towns.

RAILWAY ELECTRIFICATION.—Efforts are being made to accelerate the work of electrifying the Manchester and South Junction Railway between Manchester and Altrincham. It was hoped to have a public service inaugurated in October, but, although some portions of the work are well advanced, there has been delay in the installation of the electrical equipment. The trains will be somewhat similar to those on the Watford service, though power will be conveyed by the pantograph overhead system. They will comprise three coach units, motor trailer, trailer, and control trailer, so that they can be driven from either end. The coaches are steel-plated, and when the service is fully working there will be more than twenty trains in use.

CHANGE FROM TRAMS TO 'BUSES.—An agreement has been concluded between the Manchester Transport Committee and the Altrincham Council for the substitution of 'buses for trams in the Altrincham district. The general manager of the Transport Department estimates that the cost of renewing the existing tramway tracks, which are in a bad state, would be £144,054.

Morocco.—RAILLESS CARS.—It is reported from Casablanca that the local tramway company has decided to substitute railless cars on two of the existing electric tramway routes. Ten vehicles are, it is stated, to be placed in service.

Oldham.—ELECTRICITY METERS ON TRAMCARS.—At a recent meeting of the Corporation Tramways Committee, the general manager reported further on the question of fitting electricity meters to tramcars, and gave particulars of consumption on a few cars to which meters had been fitted. It was decided that meters should be fitted on all tramcars as they were brought in for periodical overhaul.

Pontypridd.—RAILLESS-CAR SERVICE INAUGURATED.—A service of railless cars was opened on September 18th at Pontypridd in substitution for the tramway system.

Preston.—RAILLESS CARS.—The Corporation Finance Committee has authorised the town clerk to take necessary steps for the introduction in the next session of Parliament of a Bill seeking further powers in connection with the tramway undertaking, including the running of railless cars and the borrowing of £28,000.

Telegraph and Telephone Notes.

Australia.—TELEPHONE COMMUNICATION WITH TASMANIA.—It is proposed to provide telephone communication between Tasmania and the Australian mainland. Alternative schemes are proposed, one being for submarine cable communication which would cost £193,000, and the other for wireless telephony at a cost of £58,710. The Postmaster-General has referred them to the Public Works Committee for investigation and report.

WIRELESS TELEPHONY WITH AMERICA.—Mr. C. E. Forrest, managing director at Sydney of the International Radio Corporation, who recently returned from a trip to America, states that work is well advanced for connecting Sydney with San Francisco by wireless telephony this year.

Canada.—WIRELESS COMMUNICATION IN THE ARCTIC.—Two new avenues of communication with the Far North have been completed by the installation of wireless stations at Coppermine, on Coronation Gulf, and at Chesterfield Inlet, on the north-western shore of Hudson's Bay. There is now an interconnecting wireless chain around the Canadian mainland from the Mackenzie River in the arctic to Port Arthur on Lake Superior, *via* Coppermine to the Hudson's Straits Division, thence down the east coast of Labrador to the Atlantic division and then joining the St. Lawrence chain and the Great Lakes system. Transporation of the construction crew to Coppermine was effected by aeroplane. Their equipment had been taken north from Vancouver through Behring Strait earlier in the year. Men and material for the station at Churchill were carried by a steamer which sailed around Labrador and through Hudson's Bay.—*Reuter* (Ottawa).

China.—NEW RADIO STATION.—According to information emanating from the Ministry of Communications, the construction of the large radio station at Chenju, near Shanghai, has been completed. The station will be used for the dispatch and receipt of messages to and from Europe and America and will be put into operation this month.

TELEPHONY.—The installation of the long-distance telephone service linking up the most important cities and districts in Hupeh province has been completed. The service was put into full operation recently.

Portugal.—NEW TELEGRAPH CABLE.—The Italian cableship *Dominia* has arrived at Lisbon in order to lay a cable between Portugal and Belgium on behalf of the Italcable Company. The cable is being terminated at Santo Amaro de Geiras, a watering place halfway between Lisbon and Mont Estoril, and the other end is to be at La Panne, in Belgium, where the "Italcable's" relay station is. The cable is of the most modern type, and is capable of transmitting 1,400 letters a minute in duplex. Later, "Italcable" will also install a cable from Lisbon to Malaga. The cable weighs 6,500 tons and is 1,300 miles long.—*Reuter* (Lisbon).

Telegraphy.—RATE REDUCTION.—Important reductions in telegraph rates are announced by Imperial and International Communications, Ltd., and will take effect as from October 1st as the result of an agreement with the South African Government providing for the combined working of wireless and cable telegraphy in the Union. In connection with the expected conclusion of agreements with the Governments of Australia and India, the company hopes also soon to equalise cable and wireless rates for traffic with those countries. It has also been decided to reduce the rates, both by cables and wireless circuits, from this country to South America as from October 1st, for ordinary telegrams to Argentina, Bolivia, Chile, Paraguay, Peru, and Uruguay.

The Telephone Service.—SUBSCRIPTION CALLS.—The Postmaster-General announces that subscription calls (arranged for connection at a fixed time daily, on a monthly contract basis) are now obtainable during certain periods of the day to the following Continental countries: Belgium, Czechoslovakia, Danzig, France, Germany, Holland, Luxemburg, Poland, Sarre, and Spain.

Radio Notes.

Austria.—LICENCE FEE REDUCTION.—As from October 1st Ravag's listeners are to pay a uniform fee of two schillings (about 1s. 2d.) per month in advance, and the six schillings class for the more opulent will be abolished. People with incomes of more than about three pounds a week were supposed to declare the amount and pay the higher scale. Many tricks were resorted to for the purpose of evading the higher payment, such as registering in the name of the baby, says *World-Radio*. Henceforward, however, each of the several households (or flat-holds) which share a radio service, will have to pay the two schillings, and cafes and hotels, boarding-houses, sanatoria, theatres, and circuses will have to pay four schillings monthly, and two schillings for each loud-speaker attached, because they are "public entertainers" in this instance. Radio dealers have to pay 20 schillings monthly in Vienna and Graz, 12 schillings in other places with over 20,000 inhabitants, and 6 schillings in smaller places.

Germany.—"WIRED-WIRELESS."—The Reichspost instituted in 1924 a special service of the Munich opera house performances, apart from the Bavarian broadcasting company. They were distributed by means of the existing telephone system: subscribers could, on payment of an additional fee, listen to every performance of opera at the Munich state opera house. This arrangement appealed to a certain number of people, but the total number was not sufficient to make it worth while continuing the service, and for that reason it was discontinued as from September 1st, 1930. Telephone subscribers throughout the greater part of Bavaria are offered a new service; on payment of the usual broadcast licence fee, and of an additional fee of about two marks thirty pfennigs per month, for the technical installation, every person owning a telephone can listen to the programme broadcast by the Deutsche Stunde *via* the telephone. The usual telephone service is not disturbed, as the moment someone rings up the broadcast relay is interrupted automatically. "Wired wireless," by means of special lines, has been in operation in Budapest since 1896, says *World-Radio*, and still thrives.

Licenses.—STEADY INCREASE.—The B.B.C. announces that the number of licences issued to the end of July was 3,162,460, exclusive of the 17,019 licences issued free to the blind. In November, 1924, the number of licences issued reached the 1,000,000 mark. By April, 1926, the number was 2,000,000.

Poland.—NEW TRANSMITTER.—The high-power broadcasting equipment for the new Warsaw station is now being tested at the Chelmsford works of Marconi's Wireless Telegraph Co., Ltd. The station will have an aerial power of 120 kW, the most powerful so far established in Europe, and practically the most powerful allowable under The Hague Convention.

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Argentina.—BUENOS AIRES.—Posts and Telegraphs Department. Submarine and underground cables, &c. (A.X. 10246.)*

Australia.—MELBOURNE.—Posts and Telegraphs Department. October 14th. Condensers. (A.X. 10000.)*

November 18th. Telephone receivers, ebonite earpieces, &c. (A.X. 10183.)*

November 25th. Motor-generator sets. (A.X. 10184.)*

State Electricity Commission. September 29th. Single- and 3-phase transformers and spares. (A.X. 10245.)*

Belfast.—October 15th. Harbour Commissioners. Three electrically-driven pumps at Clarendon Graving Docks. Specifications, &c., from Mr. W. Y. Chamberlain, acting chief engineer, Harbour Office, Belfast. Tenders to Mr. M. J. Watkins, general manager and secretary, Harbour Office, Belfast.

Doncaster.—September 30th. West Riding Standing Joint Committee. Installation of electric lighting at Doncaster Court House. Specifications from West Riding architect, County Hall, Wakefield.

Egypt.—ZAGAZIG.—October 15th. Municipal Council. Four 25-kVA single-phase transformers. (A.X. 10153.)*

Ely (Cambs.).—October 1st. Rural District Council. Generator, battery, switchboard, &c. (September 12th.)

Great Western Railway.—October 3rd. Telegraph instruments and electrical apparatus, including wires, cables and insulators. (September 19th.)

Grimsby.—October 3rd. Electricity Department. L.p. cables. (September 12th.)

Irlam.—September 29th. Urban District Council. Wiring for electric lighting of 140 houses now being erected. Particulars from the engineer and surveyor, Council offices.

Lichfield.—October 2nd. Rural District Council. Electrically driven pumps and automatic switchgear. Shenstone Wood End. Schedules (deposit £2 2s.) from C. E. May, Council House.

London. — CENTRAL ELECTRICITY BOARD. — October 6th. 66,000-V and 33,000-V overhead transmission lines for the North-East England Electricity Scheme. (August 29th.)

October 20th. Metering equipment for certain stations in connection with the Mid-East England Electricity Scheme. (September 5th.)

October 13th. 132,000-V transformers for the North-East England Electricity Scheme. (September 12th.)

November 3rd. 132,000-V overhead transmission lines for the South-West England and South Wales Electricity Scheme.

132,000-V overhead transmission lines for the North-East England Electricity Scheme.

Construction of site works, foundation works and buildings in the area of the Central England Electricity Scheme. (See this issue.)

OFFICE OF WORKS.—September 30th. Electric passenger lift at the Royal Hospital, Chelsea. (September 12th.)

October 7th. Electric lift at the National Physical Laboratory, Teddington. (September 19th.)

October 10th. Electric wiring at Leonard Street Post Office, Shoreditch. (September 19th.)

COUNTY OF LONDON ELECTRIC SUPPLY CO., LTD.—October 24th. Two 75,000-kW c.m.r. turbo-alternators, circulating water screening plant, condensing plant and auxiliary apparatus, and overhead electric travelling cranes, in connection with Barking power station extensions. (September 19th.)

LONDON COUNTY COUNCIL.—October 13th. Wiring and fittings for electric lighting (1,375 points) in tenement dwellings at Glebe housing estate, Peckham. (See this issue.)

November 3rd. Two 20,000-kW turbo-alternators, condensing plant, &c. (See this issue.)

October 15th. India Store Department. 20,000 negative elements for Leclanché cells. (See this issue.)

Manchester.—October 7th. Electricity Committee. Twelve months' supply of a.c. electric fan motors. (See this issue).

Newcastle-upon-Tyne. — October 10th. Newcastle-upon-Tyne Electric Supply Co., Ltd. Steel frame buildings for power station; also 120-ton and 25-ton overhead electric travelling cranes. (August 29th.)

New Zealand.—WELLINGTON.—Post and Telegraph Department. November 5th. Telephone transformers. (A.X. 10170.)*

November 4th. Telephone cable. (A.X. 10242.)*

November 20th. Telephone cordage. (A.X. 10243.)*

Rosslynlee.—September 27th. Midlothian and Peebles District Asylum. Supply of stores, including electrical fittings, &c. Forms of tender from Chilton L. Addison-Smith, W.S., clerk and treasurer, 19, Heriot Row, Edinburgh.

South Africa.—CAPE TOWN.—October 1st. City Electricity Department. Four-pin plugs and sockets. (A.X. 10166.)* Metal-clad combined switch- and fuseboards. (A.X. 10167.)*

October 16th. Electric cables. (A.X. 10162.)*

PRETORIA.—November 21st. Department of Posts and Telegraphs. Dry cells and battery material. (A.X. 10244.)*

Smethwick.—October 31st. Education Committee. Electric lighting of the Uplands School. (See this issue.)

Uruguay.—MONTEVIDEO.—October 31st. Public Cleansing Department. 1,000-kW turbo-generator, switchgear, transformers and waste fuel boilers. (A.X. 10180.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.

Contracts Closed.

Bedford.—Electricity Committee. Accepted:—
Transformers (estimated value £4,959).—British Thomson-Houston Co., Ltd.
Electric sign for High Street showrooms (£86).—General Electric Co., Ltd.
Rubber-insulated cables for 12 months.—Macintosh Cable Co., Ltd. (Recommended.)
30 miles of l.p. cable.—Siemens Bros. & Co., Ltd. (Recommended.)

Brighton.—Electricity Committee. Accepted:—
15,000-kW turbo-alternator and condensing plant for Southwick power station (£52,682).—Richardsons, Westgarth and Co., Ltd.

Finance Committee. Accepted:—
Renewals and extension of internal telephone system at the town hall.—New System Private Telephones (London), Ltd.

Croydon.—Public Assistance Committee. Accepted:—
Electrical fittings and appliances.—Omega Lamp Works, Ltd.; F. Bull.

Glasgow. — Corporation Housing Committee. Recommended:—
Electrical work at housing schemes.—Alex Robertson (£1,399); R. J. McIntyre (£1,028).

Education Committee. Accepted:—
Electric lighting of schools.—Robert Fyfe; Grindlay Ross and Co., Ltd.

Transport Committee. Accepted:—
Boiler feed pumps.—G. & J. Weir, Ltd.; Mirrlees Watson Co., Ltd.

Government Contracts.—The following contracts were placed by the various Government Departments during August:—

ADMIRALTY CONTRACT AND PURCHASE DEPARTMENT.

Batteries.—D.P. Battery Co., Ltd.; Chloride Electrical Storage Co., Ltd.; Tudor Accumulator Co., Ltd.
Electric cable.—W. T. Henley's Telegraph Works Co., Ltd.; Hooper's Telegraph & India-Rubber Works, Ltd.; Johnson & Phillips, Ltd.; St. Helens Cable and Rubber Co., Ltd.; Siemens Bros. & Co., Ltd.
Petrol-electric mobile crane.—Ransomes & Rapier, Ltd.
Electric lamps.—General Electric Co., Ltd.
Motor alternator.—Crompton Parkinson, Ltd.

WAR OFFICE.

Electric cranes.—T. Smith & Sons (Rodley), Ltd.
Generating sets.—Douglas Motors, Ltd.; Blackstone & Co., Ltd.
Electric lamps.—British Thomson-Houston Co., Ltd.; Stella Lamp Co., Ltd.; General Electric Co., Ltd.
Electricity meters.—Reason Manufacturing Co., Ltd.; Measurement, Ltd.; General Electric Co., Ltd.

AIR MINISTRY.

Accumulators.—Peto & Radford.
Ammeters.—Everett, Edcumbe & Co., Ltd.
Cockpit lamps.—D. H. Bonnella & Sons, Ltd.
Electric storage battery.—D.P. Battery Co., Ltd.
Aerodrome floodlights.—Chance Bros. & Co., Ltd.
Generators.—Haslam & Newton, Ltd.
Generating sets.—Ruston & Hornsby, Ltd.
Reaction testing apparatus.—Cambridge Instrument Co. Ltd.
W/t receivers.—Gambrell Bros., Ltd.
Transmitters.—Alfred Graham & Co., Ltd.
W/t valves.—Edison Swan Electric Co., Ltd.

CROWN AGENTS FOR THE COLONIES.

Alternator.—Petters, Ltd.
Electric motors.—Lancashire Dynamo & Motor Co., Ltd.
Electric welding plant.—Alloy Welding Processes, Ltd.
Signal materials.—Westinghouse Brake & Saxby Signal Co.
Telephone equipment.—International Automatic Telephone Co., Ltd.
Telephone switchboards.—Ericsson Telephones, Ltd.
Train lighting spares.—Chloride Electrical Storage Co., Ltd.

POST OFFICE.

Telephonic apparatus.—Automatic Telephone Manufacturing Co., Ltd.; Ericsson Telephones, Ltd.; General Electric Co., Ltd.; Phœnix Telephone & Electric Works, Ltd.; Standard Telephones & Cables, Ltd.; Telephone Manufacturing Co. (1929), Ltd.
Protective apparatus.—Phœnix Telephone & Electric Works, Ltd.
Wireless apparatus.—Standard Telephones & Cables, Ltd.; H. W. Sullivan, Ltd.
Battery stores.—Chloride Electrical Storage Co., Ltd.
Cable.—British Insulated Cables, Ltd.; Connollys (Blackley), Ltd.; Hackbridge Cable Co., Ltd.; Johnson and Phillips, Ltd.; Pirelli-General Cable Works, Ltd.; Siemens Bros. & Co., Ltd.; Standard Telephones and Cables, Ltd.
Loading coils.—Standard Telephones & Cables, Ltd.
Cords for telephones.—British Insulated Cables, Ltd.; Reliance Electrical Wire Co.; Standard Telephones and Cables, Ltd.
Insulator rings.—North British Rubber Co., Ltd.
Loading coils and terminations.—Liverpool-Colwyn Bay cable: British Insulated Cables, Ltd.
Radio station.—Two low-power telephone transmitting equipments (Rugby).—Marconi's Wireless Telegraph Co., Ltd.
Telephone exchange equipment. — Western Park (Leicester) and Hove (Brighton): Siemens Bros. and Co., Ltd. Evington (Leicester): Siemens Bros. & Co., Ltd.; sub-contractors: English Electric Co., Ltd., for charging machine; Crompton Parkinson, Ltd., for ringing machine; Chloride Electrical Storage Co., Ltd., for batteries. Byron (South Harrow): Standard Telephones and Cables, Ltd.; sub-contractors: Electric Construction Co., Ltd., for motor generators; Crompton Parkinson, Ltd., for ringing machines; Chloride Electrical Storage Co., Ltd., for batteries. Stockport (Manchester): Standard Telephones & Cables, Ltd.; sub-contractors: Electric Construction Co., Ltd., for charging machines; Crompton Parkinson, Ltd., for ringing machines; Tudor Accumulator Co., Ltd., for batteries. Holborn (Tandem) and Museum: Automatic Telephone Manufacting Co., Ltd. Downland: Automatic Telephone Manufacturing Co., Ltd.; sub-contractors: Electric Construction Co., Ltd., for motor generators and ringing machines; Alton Battery Co., Ltd., for batteries.

H.M. OFFICE OF WORKS.

Wiring (Imperial College of Science).—Electrical Installations, Ltd.

Switchgear (National Physical Laboratory).—English Electric Co., Ltd.

Wiring (National Physical Laboratory).—Twentyman and Willmott, Ltd.

Lamp Contract.—The G.P.O. has placed a contract with the British Thomson-Houston Co., Ltd., for a supply of "Mazda" vacuum and gasfilled lamps for twelve months.

London. — ISLINGTON. — Cleansing Committee. Recommended: —

Battery for Orwell electric vehicle (£105).—Edison Swan Electric Co., Ltd.

HAMMERSMITH.—Electricity Committee. Recommended:—

E.h.p. cable (£2,081).—Macintosh Cable Co., Ltd.

South Africa.—CAPE TOWN.—Health Committee. Accepted:

Electrical installation at isolation hospital (£458).—S.A. Radio and Electrical Co.

Electricity Committee. Recommended:—

Street lighting fittings and insulators (£1,379).—Davis and Soper, Ltd.

Motors and starters (£132).—S.A. General Electric Co., Ltd.

Fuse boxes.—J. C. Howard & Co., Ltd.; Albert Vaux, Ltd.; Siemens Bros. & Co. (Brit.), Ltd.

Twenty-four auto-transformers (£234).—S.A. General Electric Co., Ltd.

Electric signs for showrooms (£136).—Phillips S.A. Electric Co., Ltd.

Overhead line material (£133).—Griffin Engineering Co.

Fuse carriers, bolts and short-circuiting devices (£405).—Hubert Davies & Co., Ltd.

Stow-on-the-Wold.—Urban District Council. Accepted:—

Wiring houses for electric light (£120).—R. E. and C. Marshall (Cheltenham).

Tynemouth.—Electricity Committee. Accepted:—

Cable (£1,548).—Macintosh Cable Co., Ltd.

Walton-on-Thames.—Urban District Council. Accepted:—

Kiosks, switchgear, &c. (£1,809).—Drake & Gorham, Ltd.

Underground mains in connection with the supply to Burwood Park estate (£3,501).—Parfitt & Co., Ltd.

Watford.—Guardians' Committee. Accepted:—

Electric lamps.—British Thomson-Houston Co., Ltd.

Forthcoming Events.

Birmingham Electric Club.—September 26th. Grand Hotel, Birmingham. 7 p.m. "Electrically-driven rolling mills." Mr. H. S. Carnegie.

Electrical Power Engineers' Association (Southern Division).—September 27th. Holborn Restaurant, High Holborn, London, W.C.1. 5.30 for 6 p.m. Annual dinner.

Junior Institution of Engineers.—October 3rd. 39, Victoria Street, S.W.1. 7.30 p.m. "The development of the bridge." Mr. S. J. Crispin.

British Electrical Development Association, Inc.—October 6th. Connaught Rooms, Great Queen Street, W.C. 12.45 for 1 p.m. Shop and Display Lighting Campaign luncheon for London and Home Counties area.

Illuminating Engineering Society.—October 8th. Lighting Service Bureau, 15, Savoy Street, Strand, W.C. 6.30 p.m. Report on progress in illuminating engineering and a display of exhibits illustrating recent developments in illumination.

Institution of Chemical Engineers.—October 8th. Chemical Society, Burlington House, Piccadilly, W.1. 8 p.m. "Effect of surface conditions on heat transmission." Mr. S. J. Kohli.

Institution of Welding Engineers.—October 9th. Engineers' Club, Albert Square, Manchester. 7.45 p.m. "The training of operators in the welding and cutting industries." Mr. J. Ryder.

Institute of Marine Engineers.—October 14th. 85, The Minories, E.C. 6 p.m. "The design and manufacture of marine auxiliary oil engines." Mr. O. Wans.

Overhead Lines Association.—October 15th. Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C. 5.30 p.m. Annual general meeting.

Motor Show.—London, Olympia. October 16th-25th.

Chemical Society.—October 16th. Burlington House, Piccadilly, W.1. 8 p.m. Unveiling the Perkin Plaque.

Faraday House Old Students' Association.—October 17th. Savoy Hotel, Strand, W.C. 6.30 for 7 p.m. Annual dinner.

Association of Supervising Electrical Engineers.—October 21st. Junior Institution of Enginers, 39, Victoria Street, S.W. 7.15 p.m. Presidential address. Mr. S. B. Donkin.

Institute of Fuel.—October 22nd and 23rd. Institution of Electrical Engineers, Savoy Place, Victoria Embankment, W.C. Annual conference. October 22nd. Connaught Rooms, Great Queen Street, W.C.2. 6.45 p.m. Annual dinner.

North-East Coast Institution of Engineers and Shipbuilders.—October 24th. Opening meeting.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices:—

LONG'S LONGLIFE lamps.

ALLSCOT cable tester.

NUWAY junction box for use in concrete.

Notes.

Scientific Co-operation within the British Empire.

In the ELECTRICAL REVIEW of August 29th, 1930, some particulars were given regarding the Association for the Promotion of Co-operation between Scientific and Technical Societies within the British Empire. Institutions specifically mentioned as eligible for membership are those devoted to mining, metallurgy, chemistry, fuel, petroleum and rubber.

The Association was registered as a company on September 15th. The council of the Association, *The Times* states, includes Sir John Cadman, Dr. A. E. Dunstan, Sir Robert Hadfield, Mr. F. W. Harbord, Mr. H. Levinstein, Mr. E. Macfadyen, Mr. J. A. Reavell, Professor J. F. Thorpe, Sir Arnold T. Wilson, Sir Hugh Bell, Lord Brotherton, Lord Wakefield, and others.

The approximate cost of acquiring the site and erecting and equipping a suitable building is about £350,000. Promises of about £130,000 have been received, including a donation of £10,000 from Mr. Robert Mond. An appeal for funds will shortly be issued, and a dinner in support of the movement will be given at the Guildhall on November 13th by the Empire Council, at which the Prince of Wales will be present.

One important feature of the scheme is the concentration in the proposed building of the libraries of the associated scientific and technical institutions. The largest library is that of the Chemical Society, containing some 33,000 volumes, and having a yearly increase of approximately 900. Under the scheme a central library composed of the 70,000 volumes, exclusive of pamphlets, at present available will occupy the whole of one floor of the new building, and there will be an information bureau to direct the research worker or student to the source from which the information he requires can be obtained.

Illuminations at Morecambe.

Electrical illuminations formed one of the chief features of the Twelfth Annual Autumn Carnival at Morecambe, some 15,000 electric lamps being utilised for the decorative lighting arranged along the sea-front by the Corporation Electricity Committee, and on many of the promenade buildings by private contractors. The Carnival was held from September 13th to 20th.

Rural Supplies for Warrington.

Grappenhall Parish Council at a special meeting reversed a decision come to at a previous meeting to oppose the construction of overhead lines by Warrington Corporation for the purpose of giving a supply of electricity in Appleton. At the earlier meeting a resolution was passed (in spite of the favourable attitude of the chairman of Grappenhall Parish Council, Mr. H. Trencher Nicholls) that Runcorn R.D.C. should be informed that overhead lines were not desired in the parish. The change of attitude was due to a feeling among the councillors, after mature consideration, that an injustice would be done to farmers who would not be able to secure a supply of electricity unless overhead lines were used; the use of underground cable for the extension would make the scheme impossible on the ground of cost. It was stated that Warrington Corporation was prepared to supply electricity in rural areas at the same price as in Warrington itself.

The New Fulham Station.

In a report of the Electricity and Lighting Committee of the Council of the Metropolitan Borough of Fulham which was to be considered by the Council at its meeting on September 24th, some interesting details are given of the proposed new Fulham electricity generating station. The consulting engineers, Messrs. Preece, Cardew & Rider, and Mr. A. J. Fuller, have completed their designs, and the plans and estimates have been approved by the Central Electricity Board. The next step is to obtain the consent of the Electricity Commissioners and the approval of the Commissioners of Works. It is proposed to purchase properties adjoining the present power station. The total area to be occupied by the new station and its accessories will be about 10 acres. The new station will feed into the grid, and it will be built in several stages. The first section will have an installed and working capacity of 132,000 kW, and the completed station is laid out for 318,000 kW. The principal portions of the buildings will be the turbine room, parallel to Townmead Road, and two boiler houses, at right angles to and between the turbine room and the river. Each boiler house will have two 300-ft. chimneys. The estimated cost of the first portion of the buildings is £475,000, and of the completed buildings £938,300. The water supply for the condensers will be taken from and returned to the river by underground channels. About nine million gallons per hour of condensing water will be required by the first section of the station. Coal will be brought by river to a jetty to be built and unloaded by large electric cranes and grabs. Belt conveyors will be used to carry the coal, either direct to the boiler houses or to two large coal dumps, one of which only will be built for the first section of the station. Assuming an annual load factor of 50 per cent., and coal of an average calorific value, the first section of the station will consume about 900 tons per day for a maximum load of 120,000 kW; the completed station will consume about 2,250 tons of coal per day for a load of 300,000 kW. The ashes will be conveyed in water troughs from beneath the boilers to a large storage sump adjoining the river. They will be lifted by grabs and passed through grading plant, with a view to their sale for various commercial purposes. If the coal has an ash content of 12 per cent., the quantity of ashes to be dealt with will be about 110 tons per day for the first section of the station, and about 275 tons per day for the completed station. The estimated costs of the coal- and ash-storage and handling plant are £115,400 for the first section, and £171,100 for the completed station. The turbine room is laid out for, ultimately, five main 60,000-kW turbo-alternators, 11,000 V, 3-phase, 50 cycles, and three 6,000-kW house sets; in the first section there will be two main and two house machines. The estimated costs of the turbine-room equipment are £439,000 for the first section, and £1,030,400 for the completed station. Each boiler house will contain ultimately eight 250,000-lb. water-tube boilers, with mechanical stokers; in the first portion there will be six boilers in one house. The generated steam conditions will be 600 lb. per sq. in. and 800 deg. F. The estimated costs of the boiler plant are £623,900 for the first section of the station and £1,641,600 for the completed station. The generation pressure (11,000 V) will be raised to 66,000 V by means of transformers connected one to each alternator. The main switchgear, which will be housed in separate cubicles and operated electrically from a control room at the end of the turbine room, is designed for controlling five turbo-alternators and twenty feeder cables. The estimated costs of the switchgear, transformers and connecting cables are £184,600 for the first part of the station and £457,100 for the completed works. The total estimated cost of the initial stage is £2,790,935, or £21.143 per kW; the final total cost is estimated at £5,530,050, or £17.39 per kW. The costs are relatively high for two principal reasons: the cost of the site is high, due to trade disturbance; boiler plant, with increased buildings and accessories, has had to be provided to enable the working capacity of the station to be brought up to the installed capacity.

Appointments Vacant.

Mains assistant engineer for the Norwich Electricity Department.

Mains draughtsman for Blackburn Electricity Department.

Draughtsman for the West Midlands Joint Electricity Authority.

(See our advertisement pages to-day.)

National Smoke Abatement Society.

The second annual conference of the National Smoke Abatement Society opens in Leicester this evening at 7.30 p.m. and will conclude on Sunday, the 28th inst. The public meeting to-night will have as its principal speakers Dr. R. Veitch Clark, medical officer of health for Manchester, and Mrs. Millicent Just, who will deal with the smoke nuisance as it affects the home and the housewife.

On Saturday morning two papers are to be read by Messrs. M. G. Bennett and F. Entwistle, of the Meteorological Office of the Air Ministry. These deal with a new and increasingly serious aspect of the smoke nuisance, namely, the difficulties encountered in piloting aeroplanes across smoke-laden industrial areas.

On Sunday morning Dr. Margaret Fishenden (Department of Scientific and Industrial Research) will read a paper on "Fuel Research and Smoke Abatement."

Fatalities.

The Times reports that John Broadhurst (32) received a fatal electric shock while working on the scenic railway at Belle Vue Amusement Park, Manchester.

A fatal accident occurred at the Hilton Main Colliery, near Wolverhampton, on September 20th, John Crudgington (64), a repairer, apparently receiving an electric shock. The *Birmingham Post* states that he was repairing a road in the colliery, when, it is believed, a tub he was using cut through a trailing cable which passes from the main cable to the coal cutter. The voltage was 450. He collapsed, and although artificial respiration was applied, and two doctors were called in, he failed to recover.

Bradford Extensions.

On September 18th, H.R.H. Princess Mary started up, and named after herself, at the Valley Road generating station of Bradford Corporation, the new 30,000-kW turbo-generator which is part of a big scheme of extensions in progress there. The generator was supplied by the English Electric Co., Ltd., the chairman of which company, Sir Holberry Mensforth, was among those presented to Her Royal Highness and the Earl of Harewood. It is an interesting coincidence that the starting up of the new plant was within two days of the 41st anniversary of the opening of Bradford's first electricity station at Bolton Road. The new generator, 3,000 r.p.m., forms part of the new plant for which the boiler, with the highest steam pressure in the country, is being prepared, but it will be used for supplementing the coming winter power production if necessary. The set has been constructed to the plans and specifications of Mr. T. Roles, the city electrical engineer. The English Electric Co. built the turbine and condenser, and sub-let to Messrs. C. A. Parsons & Co., Ltd., the contract for the generator. The running of the set will involve the use of 135 tons of steam per hour, at a pressure of 200 lb. to the square inch and a temperature of 750 deg. Fahr. The installation is unique in this country, in that the steam, when being passed from the high-pressure cylinders to the low-pressure cylinders, is re-heated by high-pressure steam to be obtained from the plant now being installed. This plant will operate at a pressure of 1,100 lb. to the sq. inch. The length of the new set, 61 ft. 3 in. overall, has necessitated an extension of the turbine house by 115 ft., making the room now 350 ft. long by 36 ft. wide. The new plant will bring the capacity of the works to well over 100,000 kW, making it the largest individual generating station in Yorkshire. The stator and alternator weigh 72 tons, and the rotating parts 38½ tons. The greatest diameter across the blade tips of the turbine is 6 ft. 4 in.

Alderman Longley, chairman of the Electricity Committee, asked the Princess to start up the new set, and also presented her, on behalf of the Committee, with a Mexican onyx inkstand and a silver-gilt electric table reading lamp. Her Royal Highness unveiled a plate on the turbine which bears the inscription "Princess Mary, September 18th, 1930." The Earl of Harewood said that one of the great evils of the present time which they had to combat in the West Riding was smoke, and anything which supplied power without polluting the air was welcome to all of them.

Generation of Electricity.

The official returns rendered to the Electricity Commissioners show that 721 million kWh were generated by authorised undertakers in Great Britain during the month of August, 1930, as compared with 706 million kWh in the corresponding month of 1929, or an increase of 2.1 per cent. During the eight months of 1930, up to the end of August, the total amount of electricity generated by authorised undertakers was 6,888 million kWh, as compared with 6,536 million kWh for the corresponding period of 1929, representing an increase of 5.4 per cent.

The Women's Engineering Society.

At the annual conference of the Women's Engineering Society, held at Oxford, commencing on September 19th, 1930, a paper was read by Miss Linford and Miss Davies (members of the technical staff of the British Thomson-Houston Co., Ltd.) on "Research in a Large Electrical Firm," which was illustrated with lantern slides and demonstrations of new "talkie" apparatus and recent research work carried out by the British Thomson-Houston Co., Ltd. This paper replaced the one scheduled to be read by the German member.

The Institution of Electrical Engineers.

The following scholarships have been awarded by the Institution of Electrical Engineers for 1930:—

Ferranti Scholarship (annual value £250, tenable for two years), E. Wilkinson (Liverpool University); Duddell Scholarship (annual value £150, tenable for three years), T. R. Stretton (Cardiff Technical College); David Hughes Scholarship (value £100, tenable for one year), H. A. Wainwright (Sheffield University); Salomons Scholarship (value £100, tenable for one year), E. Bell (Armstrong College, Newcastle-on-Tyne); War Thanksgiving Education and Research Fund (No. 1), grants of £50 each to F. J. Clark (East London College) and Miss W. Hackett (Birmingham University); Thorrowgood Scholarship (annual value £25, tenable for two years), J. F. H. Tyler (Southern Railway Company).

Immunity of " Copperweld " Wires from Looting.

Looting of copper wires on railways and telegraph and telephone lines has been a serious problem in many countries ever since the installation of these services, and has resulted in heavy maintenance costs. Copper finds a ready market in the bazaars of some oriental countries, and, being readily worked and of good appearance, it is prized by many races for the purpose of personal adornment. In fact, copper rings are current coin in at least one part of the world. There is, however, now available, in " Copperweld," a product of British Insulated Cables, Ltd., a material which is practically immune from the looting pest. Wire of this material, which consists of a steel core to which is welded a covering of copper, is coming to the front as a material for telegraph and telephone lines, stay and catenary wires, and for the track bonds used on steam railways for signalling purposes. In addition to other advantages attending the use of this material, it has been found that thieves will avoid being caught with any " Copperweld " wire on their hands. It immediately identifies them as having property stolen from the public services, insomuch as this type of wire would usually not be found in the possession of private industrial concerns, whilst any attempt to salvage the copper by melting it from the steel core would result in loss, because of the great expense and highly unsatisfactory results. The substitution of " Copperweld " for copper, combined with publicity before as well as after the installation, has proved very successful in those areas where the looting problem had previously been serious.

Educational.

UNIVERSITY OF MANCHESTER, FACULTY OF TECHNOLOGY.—The 1930-31 session will open on October 2nd, 1930. Students will be enrolled on September 29th and 30th, and October 1st.

UNIVERSITY OF LONDON, UNIVERSITY COLLEGE.—The 1930-31 session will commence on October 6th.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

While it is a pleasure to congratulate **Lt.-Col. W. A. Vignoles** upon the change that he is shortly to make from one important position to another in connection with the electrical industry, we are sure that his departure from the British Electrical Development Association will be very widely regretted. Col. Vignoles intimated at the last meeting of the Executive Committee that he would shortly be submitting his resignation of the directorship to the Council as he had been offered the position of joint-managing director of Evershed and Vignoles, Ltd., and he felt that, especially in view of the family connection, he should accept the offer. He suggested that his resignation might take effect at the end of the year. During the three years that Colonel Vignoles has been the director, the organisation has been considerably developed. Permanent Area Committees have been set up and paid officers appointed in provincial areas, enabling the Association both to increase its own efficiency to the industry and to secure additional support for the Association. In joining the firm of Messrs. Evershed & Vignoles, Colonel Vignoles returns to a connection made many years ago, when he was a pupil under Mr. Llewelyn B. Atkinson at W. T. Goolden & Co. The instrument business of that firm, then under Mr. Sydney Evershed, was later purchased and developed as a separate business, Mr. E. B. Vignoles, Colonel Vignoles's brother, joining with Mr. Evershed in establishing the new firm. We tender to Col. Vignoles our hearty good wishes for his prosperity in his new activity. We feel that we are but expressing the feelings of a host of his friends and admirers.

Col. J. B. Neilson, C.M.G., has been appointed to the board of Vickers-Armstrong, Ltd., to fill the vacancy caused by the death of Mr. G. G. Sim.

A newspaper report from Rome states that the King of Italy has signed a decree appointing Senator Marconi president of the Italian Academy.

Mr. W. M. Winstanley has been appointed general manager of the British General Electric Co., Ltd., of South Africa, in succession to Mr. W. B. Phelp, who, as already announced here, was fatally injured in an accident at Pontresina, near St. Moritz, on August 10th. Mr. Winstanley was formerly chief engineer to the company.

Mr. C. W. Charlesworth, the new chairman of the British Radio Valve Manufacturers' Association, during his connection with the electrical industry, dating back to 1907, has been associated with many important enterprises. Early in his career he was engaged in the re-organisation of electricity supplies in the North-West Midland districts, and subsequently, amongst other activities, he occupied positions of manager to Marconi's Wireless Telegraph Co., Ltd., at Chelmsford, and manager of the Sterling Telephone and Electric Co., Ltd. He has been connected with the construction of many powerful broadcasting stations in Europe, amongst them being Brookmans Park and Motala. He is at present connected with the Gramophone Co., Ltd. (" H.M.V."), his positions including that of general manager of the Marconiphone Co., Ltd.

Mr. Charles Anderson, electrician of the beet sugar factory, Cupar, Fife, was presented with a chiming clock on Friday last by his colleagues, on the occasion of his marriage. Mr. Wm. Rilett, chief engineer, made the presentation.

Mr. R. H. Wilkinson has resigned his position as manager of the Bradford Corporation tramways on the ground of ill-health, on a pension of £400 per annum. Mr. Wilkinson, who was appointed in 1918, is a member of the Institute of Transport and an associate member of the I.E.E. He formerly held appointments at Huddersfield and Oldham.

Mr. C. W. Jackson, M.I.E.E., A.M.I.Mech.E., borough electrical engineer of King's Lynn, has been appointed engineer and manager of Yarmouth Corporation electricity undertaking.

Mr. Harry A. Blackburn, A.M.Inst.T., Assoc. I.E.E., general manager and engineer of Keighley Corporation tramways, has been appointed transport manager to the Yarmouth Corporation.

The Council of the Junior Institution of Engineers has made the following awards to members for the session ending September 30th, 1930: The Institution Gold Medal to **Mr. H. Southern;** the Institution Silver Medal to **Mr. R. H. Allen;** the Vickers Gold Medal and prize to **Mr. H. J. N. Riddle;** the Dunn Medal to **Mr. J. G. Hopcraft;** and the Tookey Award to **Mr. C. J. Hill.**

Mr. F. H. Pooles, resident engineer at the Hams Hall power station, Birmingham, is recommended for the position of deputy borough electrical engineer of Derby.

On leaving Dawlish, where he has been engineer and secretary of the electricity undertaking, to take charge of the St. Austell electricity undertaking, **Mr. C. C. Hodges** was presented with a golfing equipment from the staff and employés.

As already stated, **Mr. D. H. Morris,** whose photograph accompanies these notes, has been appointed president of the Electrical Contractors' Association of Scotland.

W. M. Scott] [*Dundee*

Mr. D. H. Morris.

The New President of the E.C.A. of Scotland.

In our last issue we stated " on the authority of the local Press " that the electrical installation at Glamis Castle was carried out by Mr. D. H. Morris. **Messrs. Lowdon Bros. and Co., Ltd.,** write correcting this and stating that the installation was carried out by them.

Mr. G. G. Elliott, system manager of the South African Railways, is retiring on October 1st, and later, says *South Africa,* will take up a position on the S.A. Electricity Commission.

The accompanying photograph was taken on the occasion of the opening of Dunoon electricity undertaking, which was referred to in our "Notes" last week, during the presentations of electric lamp standards to Mrs. Turner and Mrs.

The Inauguration of the Dunoon Undertaking.

McFarlane. The picture shows Sir Philip Dawson, M.P. (who presided at the luncheon), Mr. George Gillespie, A.M.I.E.E., and Mr. Charles Stewart, M.I.E.E. (directors of Johnson and Phillips, Ltd., who formed the Dunoon & District Electricity Supply Co.), also Lady Dawson, Provost Colin Turner and Mrs. Turner, while Mr. J. Ratcliffe, the resident engineer and manager, appears in the background. Mr. Ratcliffe was appointed resident engineer and manager to the Dunoon and District Electricity Supply Co., Ltd., in May last. He was for some years on the staffs of British Electrical Federation, the Birkdale District Electricity Supply Co., Ltd., and the Bolton Corporation Electricity Department. In the course of his earlier appointments he was connected with the Edison companies operating throughout Italy.

Obituary.

Mr. C. D. Hall.—We regret to learn of the death which occurred unexpectedly on September 16th, of Mr. C. D. Hall, who was elected honorary secretary of the Students' Section of the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers for the 1930/31 session. Mr. Hall entered the Faculty of Engineering at Liverpool University in 1926 with a Bartlett Scholarship, and achieved almost every academic distinction within his reach. He was awarded the David Inglis Dawbarn Prize in 1928 as the best student of his year, and obtained the degree B.Eng. with first-class honours, being awarded a University Scholarship, and also the David Rew Memorial Scholarship. Since that time he had been engaged on research work in the electrical engineering department and had ready for publication a paper on a special valve circuit for use in wireless. He read a paper last session before the Students' Section of the Liverpool Centre on the thermionic valve, for which he was awarded a special prize.

Mr. James Best.—The *South African Engineer and Electrical Review* reports the recent death of Mr. James Best, A.C.G.I., A.M.I.E.E., who since 1924, had held the position of senior lecturer in the Department of Electrical Engineering of the Cape Technical College, Capetown.

Will.—The late **Mr. Charles E. Stuart,** a director of the Tamworth Electricity Supply Co., Ltd., left estate valued at £7,169 gross (£2,958 net).

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

Universal Appliances, Ltd.—Private company. Registered September 19th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers, importers, exporters and repairers of and dealers in vacuum cleaners, stoves, fires, cookers, heaters, refrigerators, dynamos, transformers, batteries, accumulators, &c. The subscribers are: W. F. Harkness, 2, Rugby Mansions, Addison Bridge, W.14, merchant; and D. F. Cubitt, Amberley House, Norfolk Street, Strand, W.C.2, cashier. W. F. Harkness and H. J. Kennedy are to be two of the first directors. Solicitors: Bulcraig and Davis, Amberley House, Norfolk Street, W.C.2.

Carbon Specialists, Ltd.—Private company. Registered September 19th. Capital, £3,000 in 10s. shares. Objects: To manufacture and produce and deal in carbons for all electrical and other purposes and all mechanical equipment, apparatus, &c., in connection with the business of electricians, mechanical engineers, manufacturers, workers and dealers in electricity, motive power and light, &c. The subscribers are: G. H. Leslie, Tayler Hill, Ewell, Surrey, and W. H. Shikesman, 15, Beckford Road, Addiscombe, near Croydon, Surrey. Secretary: G. H. Leslie. Registered office: 36, Bedford Row, W.C.1.

Llanfachreth Mill, Ltd.—Private company. Registered September 19th. Capital, £1,000 in £1 shares. Objects: To carry on the businesses of producing and supplying electric light and power to the village of Llanfachreth, Merioneth, and the district and operating machinery for milling, sawing, sheep shearing, &c. The permanent directors are: Maj.-Gen. J. Vaughan, C.B., C.M.G., D.S.O., Maesybryner, Dolgelly (retired); Rev. D. B. Jenkins, The Vicarage, Llanfachreth; J. Evans, and H. Williams (addresses not stated). Secretary: J. J. Williams. Solicitors: Wm. Griffiths, Adams & Williams, Dolgelly.

Poole & Seel, Ltd.—Private company. Registered September 19th. Capital, £1,000 in £1 shares. Objects: To adopt an agreement with H. J. Poole, Ltd., and E. H. Seel, and to carry on the business of agents, merchants, importers and exporters, electrical and mechanical engineers, manufacturers of electrical, magnetic, galvanic and other apparatus and machinery, &c. The directors are: H. J. Poole and E. H. Seel (addresses not stated). The subscribers (each with one share) are: T. R. S. Perry, Tetherdown, South Drive, Cheam, Surrey; and H. W. Love, 8, Longstaff Crescent, Wandsworth, S.W.18, solicitor's clerks. Solicitors: Wordsworth Marr Johnson & Shaw, 39, Lombard Street, E.C.

Glenarm and District Electric Supply Co., Ltd.—Private company. Registered September 8th in Belfast. Capital: £6,000 in £1 shares. Objects: To acquire from the Antrim Supply Co. a bulk supply of electricity for Glenarm and district. The directors are: The Earl of Antrim, Glenarm; Agnes B. Kirk, Doagh Larne; Violet P. H. Moore, Cairncastle; J. Thompson, J.P., Glenarm; J. J. Wall, J.P., Glenarm; J. Foster, J.P., Carnlough; J. C. Tweed, Larne, solicitor. Secretary: John Thompson. Registered offices: Glenarm, Co. Antrim.

Service Electric Co., Ltd.—Private company. Registered September 16th. Capital, £2,500 in £1 shares. Objects: To acquire the business of electrical and mechanical engineers carried on by E. S. Russell and Caroline E. Russell at 243, Great College Street, S.W., as "E. S. Russell & Co.," and to carry on this and the business of wireless, motor and general engineers and engineering contractors, electrical installation contractors, &c. The first directors are: Caroline E. Russell, address not stated; Mrs. L. C. Russell, 82, Maida Vale, W.9; W. M. Grant, 42, Brewery Road, Plumstead, S.E.18, electrical engineer.

Mechanical and Electrical Engineering Co. (Sheffield), Ltd.—Private company. Registered September 12th. Capital, £1,500 in £1 shares. Objects: To carry on the business of proprietors and repairers of and dealers in general, mechanical, electrical and radio engineering, suppliers of machine tools, electrical plant, &c. The directors are: H. J. Webb, 62, Bradford Street, Walsall; A. Webb, 80, Meadow Head, Sheffield. Registered office: 8, Hereford Street, Sheffield.

H. Featherstone, Ltd.—Private company. Registered September 13th. Capital, £3,000 in £1 shares. Objects: To acquire the business of a radio, electrical and general engineer now carried on by H. Featherstone in Tunbridge Wells, Wadhurst, Maidstone, &c. The directors are: H. Featherstone, Ridgewood, Bidborough, Kent (director of Tunbridge

Wells Publicity, Ltd.); Mrs. Ethel M. Featherstone, Ridgewood, Bidborough, Kent. Registered office: 22, London Road, Tunbridge Wells.

London Accumulator Service Co., Ltd.—Private company. Registered September 15th. Capital, £2,000 in 1,500 6 per cent. cumulative participating preference shares of £1 each and 2,000 ordinary shares of 5s. each. Objects: To carry on the business of general and electrical engineers and contractors, manufacturers and dealers, &c. The directors are: J. Woodward, 58a, Sinclair Road, W.14; P. J. Garthwaite, 75, Stephendale Road, Fulham, S.W.6. Registered office: 265, Strand, W.C.2.

Official Returns of Electrical Companies.

Rangoon Electric Tramway and Supply Co., Ltd.—Satisfaction to the extent of £11,990 on April 25th, 1930, of first mortgage debenture stock secured by trust deeds dated February 1st, 1906, December 22nd, 1908, November 5th, 1913, and January 25th, 1924, and registered February 15th, 1906, December 31st, 1908, November 18th, 1913, and March 10th, 1924, respectively, securing £250,000.

A.F.M. Electrical Service, Ltd.—Issue on August 27th, 1930, of £200 debentures, part of a series already registered.

Runbaken Motor and Electrical Accessories, Ltd.—J. W. Shepherd, C.B.E., incorporated accountant, of 78, King Street, Manchester, was appointed receiver and manager on September 11th, 1930, under powers contained in debentures dated November 14th, 1929.

Yorkshire Switchgear and Engineering Co., Ltd.—Capital, £10,000 in £1 shares. Return dated May 12th, 1930. 5,382 shares taken up. £2,382 paid. £3,000 considered as paid. Mortgages and charges, £3,680 2s.

George Bray & Co., Ltd.—Capital, £160,000 in 80,000 preference and 80,000 ordinary shares of £1 each. Return dated May 19th, 1930. 55,000 preference and 55,000 ordinary shares taken up. £7 paid. £109,993 considered as paid. Mortgages and charges, £40,000.

Barrow & Co., Ltd.—Capital, £5,000 in £1 shares. Return dated May 15th, 1930. 1,634 shares taken up. £34 paid. £1,600 considered as paid. Mortgages and charges, nil. A return of allotments made up to July 31st, 1930, shows a further 35 shares allotted, payable in cash and fully called up.

Sunray, Ltd.—Capital, £2,000 in £1 shares. Return dated April 11th, 1930. All shares taken up. £2,000 paid. Mortgages and charges, nil.

Mansfield & District Tramways, Ltd.—Capital, £180,000 in 80,000 preference and 100,000 ordinary shares of £1 each. Return dated June 19th, 1930. 80,000 preference and 44,834 ordinary shares taken up. £80,609 paid on 62,767 preference and 17,842 ordinary shares. £44,225 considered as paid on 17,233 preference and 26,992 ordinary shares. Mortgages and charges, £77,611.

Croydon Cable Works, Ltd.—Capital, £173,661 in 35,000 first preference, 25,000 second preference, 14,100 third preference, and 99,561 ordinary shares of £1 each. Return dated August 11th, 1930. 35,000 first preference, 25,000 second preference, 14,100 third preference, and 34,527 ordinary shares taken up. £35,000 paid. £73,627 considered as paid. Mortgages and charges, £65,000.

Yorkshire (Woollen District) Electric Tramways, Ltd.—Capital, £500,000 in 250,000 preference and 250,000 ordinary shares of £1 each. Return dated June 9th, 1930. 220,000 ordinary shares taken up. £220,000 paid. Mortgages and charges, £34,800 debentures issued to bankers as collateral security.

Chepstow Electric Lighting & Power Co., Ltd.—Capital, £10,000 in £1 shares. Return dated March 28th, 1930. 5,510 shares taken up. £1,605 paid. £3,905 considered as paid. Mortgages and charges, £1,000.

Weston Electric Lamp Co., Ltd.—Particulars filed of £200 debentures authorised July 24th, 1930, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

A. Hirst & Son, Ltd.—Capital, £2,000 in 100 preference and 1,900 ordinary shares of £10 each. Return dated June 6th, 1930. 100 preference and 1,200 ordinary shares taken up. £2,200 paid on 100 preference and 120 ordinary shares. £11,000 considered as paid on 1,100 ordinary shares. Mortgages and charges, nil.

West London and Provincial Electric and General Trust, Ltd.—Capital stock, £390,000 in £198,0000 ordinary stock and £192,000 5 per cent. preference stock. Return dated May 9th, 1930. All stock taken up. £264,000 paid. £126,000 considered as paid. Mortgages and charges, nil.

Camborne Electricity Supply Co., Ltd.—Capital, £20,000 in £1 shares. Return dated April 24th, 1930. All shares taken up. £20,000 paid. Mortgages and charges, nil.

Merthyr Electric Traction and Lighting Co., Ltd.—Capital, £100,000 in 6,000 preference and 14,000 ordinary shares of £5 each. Return dated June 17th, 1930. 6,000 preference and 13,000 ordinary shares taken up. £95,000 paid. Mortgages and charges, £48,400.

Provincial Tramways Co., Ltd.—Capital, £275,440 in 10,000 preference shares of £10 and 175,440 ordinary shares of £1 each. Return dated April 17th, 1930. 10,000 preference and 124,560 ordinary shares taken up. £162,700 paid on 3,814 preference and 124,560 ordinary shares. £61,860 considered as paid on 6,186 preference shares. Mortgages and charges: £80,140.

Mur-Ray Signs, Ltd.—Capital, £37,500 in 25,000 6 per cent. cumulative preference shares of £1 and 125,000 ordinary shares of 2s. each. Return dated July 7th, 1930. 24,258 preference and 124,998 ordinary shares taken up. £36,432 16s. paid, leaving £325 calls unpaid. Mortgages and charges, nil. On June 23rd, 1930, it was resolved to reduce the capital to £31,500 by cancelling 60,000 ordinary shares to be surrendered by R. H. Murray in pursuance of a provisional agreement made November 1st, 1928. No Order of Court sanctioning such reduction was on file to September 10th, 1930.

Eckington Electric Supply Co., Ltd.—Capital, £5,000 in £1 shares. Return dated August 20th, 1930. All shares taken up. £5,000 paid. Mortgages and charges, nil.

City Notes.

Crompton Parkinson, Ltd.

Presiding at the annual meeting held at Bush House, London, on September 18th, Mr. Frank Parkinson, the chairman, first referred to the addition to the board of Mr. E. J. Fox, managing director of the Stanton Ironworks Co., Ltd. He said that during the past year the volume of sales had exceeded all previous records. General trade depression had been experienced, and the intense competition between manufacturers of electrical machinery, to which he referred last year, still continued. The board had actively pursued the policy of strengthening the company's position, and during the year new plant and equipment had been installed at the factories, which, together with improvements in design, enabled them to manufacture electrical apparatus worthy of the high reputation which the company's products had always enjoyed, and at the same time to meet all competition.

There was, they believed, a growing desire on the part of a number of manufacturers of electrical plant to stop the severe price cutting that had been practised during the past two or three years. In the view of the board, co-operation towards that end must be based on and governed by strictly economic considerations and could not otherwise be fruitful. In any negotiations on those lines the board felt that the company was strongly placed. The directors were continuously alert to the possibilities of extending the company's activities in directions where the resources and experience of the company could be profitably employed.

The board, after careful consideration, had decided that the company's unique experience and world-wide connection justified them in extending their activities to include the manufacture and sale throughout the world of incandescent electric lamps. They had accordingly purchased the whole of the share capital of a British non-combine lamp works, and proposed to extend and develop this side of the electrical business to meet the increasing world demand for electric lamps. This transaction had been completed since the close of the company's financial year, and consequently was not included in the report and balance-sheet. In October last, in order to finance the growing needs of the business, they offered to the ordinary shareholders 200,000 new ordinary shares of 5s. each for subscription in the proportion of one in two on the bonus terms of 10s. per share. The whole of this money, amounting to £100,000, was subscribed, and had been absorbed into the working assets of the company. The additional profit required to maintain a dividend on the ordinary shares at the rate of 30 per cent. per annum on the increased share capital of the company was £15,000, so that their profit in the past year had exceeded the amount necessary for this purpose by more than £6,000. The directors proposed to add £15,000 to the general reserve account and to maintain the dividend on the ordinary shares at the same rate as in the previous year, so that a final dividend at the rate of 18¾ per cent. actual would be declared.

For the purpose of financing the purchase of the lamp company and the considerable extensions of its activities which were in prospect and for the normal expansion of their engineering business, additional capital was now required.

An extraordinary meeting would follow that meeting for the purpose of creating 600,000 new "A" ordinary shares of 5s. each. These shares would carry no voting rights, but in other respects for capital dividend and in profits would rank equally with the existing ordinary shares. It was proposed that immediately after the creation of these shares 150,000 would be offered to the existing ordinary shareholders in the ratio of one new share for every four shares held, at a price of 12s. 6d. per share. The board was very gratified to be able again to offer shares on bonus terms, an achievement which had been made possible by the continued increase in the profits of the company and the further building up of the reserves.

They had decided to alter the financial year. The current financial period would be one of 15 months terminating on September 30th, 1931. This would alter the dates for the payment of interim and final dividends from March and September to June and December.

General Electric Debenture Issue.

The prospectus of the General Electric Co., Ltd., issuing £3,500,000 5 per cent. mortgage debenture stock at 98 per cent. has been before the public this week. The list opened on Monday and was to close "on or before" Wednesday for cash applicants, but, as a matter of fact, it was closed within a few hours. Applications by the holders of the existing 7 per cent. debenture stock desirous of converting their holdings, are receivable up to and including Monday next, September 29th. The amount of 7 per cent. stock outstanding was £2,919,340 and holders had the right to convert into an equivalent amount of 5 per cent. stock, together with a cash payment of £4 per cent. in addition to the interest accrued up to September 30th on the stock so converted. The new debentures are redeemable at 100 by 1967 by drawings at 100 per cent. or by purchase at or under 100 per cent.; or up to and including September 30th, 1937, at 105 per cent.; or after September 30th, 1937, and up to and including September 30th, 1947, at 102 per cent.; or thereafter at 100 per cent. The prospectus showed assets sufficient to cover the debenture stock offered more than three times and the profits, quoted for five years, showed sufficient to cover the interest and sinking fund for the new issue (£210,000 per annum) more than four times, without reckoning any additional profits from the use in business expansion of the extra capital raised by the issue. The altered rate of debenture interest will result in a large saving in prior charges.

United River Plate Telephone Co., Ltd.

The annual meeting was held on September 15th. According to the *Financial News*, Mr. E. S. Byng, who presided, said that at the last meeting it was reported that owing to the cancellation by the Argentine Government of a portion of the company's tariffs they were unable to meet the usual dividend on the ordinary shares without drawing upon past profits. That course was again necessary for the period under review. It was confidently expected that that particular question between themselves and the Government would have been arranged long before the close of last year, but there had been many unforeseen difficulties, and the desirable adjustment still remained unsettled. The year had been marked by a gratifying expansion in the number of their subscribers, and very substantial progress had been made in the realisation of the programme which they had worked out with the advice and assistance of the International Telephone and Telegraph Corporation for the development of their whole plant. During the current year it was their intention to make very considerable extensions to their local and toll line plant, estimates having been approved for over £2,300,000. The report and accounts were adopted.

Scottish Electric Power Co.

The directors of the Scottish Power Co. have been in negotiation with the directors of the Scottish Southern Electric Supply Co., Ltd., with a view to the acquisition of the issued share capital of the company which consists of 120,000 6 per cent. cumulative preference shares of £1 each and 80,000 ordinary shares of £1 each, all fully paid. An offer made to acquire the shares of the Scottish Southern Co. on the basis of an exchange for an equal number of preference and ordinary shares of the Scottish Power Co. has now been accepted by all shareholders of the Scottish Southern Co., with the exception of the holders of 30 ordinary shares.

Companies to be Struck off the Register.

The names of the undermentioned will be struck off the Register at the expiration of three months, unless cause is shown to the contrary:—

British Portable Radio, Ltd.
J. Lyons (Electrical and Wireless), Ltd.
Johnson-Billington Electricity Meters, Ltd.
Wayne Engineering & Equipment Co., Ltd.

Direct Spanish Telegraph Co., Ltd.

The board has decided to pay in addition to the dividend for the half-year to June 30th last at the rate of 10 per cent. per annum on the preference shares, an interim dividend of 3 per cent., free of tax, on the ordinary shares.

Eastern Telegraph Co., Ltd.

The directors announce the payment of a dividend at the rate of 3½ per cent. per annum, less tax, on the preference stock for the quarter ending September 30th.

Montreal Light, Heat and Power Consolidated.

A dividend is announced of 37 cents per share on the new common shares for the quarter ending September 30th.

Shawinigan Water and Power Co.

A dividend of $¾ per share is announced on the common shares for the quarter ending September 30th.

Hopkinsons, Ltd.

An interim dividend is announced of 2½ per cent. less tax, on the ordinary shares (against 5 per cent.).

Parker, Winder & Achurch, Ltd.

An interim dividend has been declared on the ordinary shares of 2½ per cent. (same).

Stocks and Shares.

TUESDAY EVENING.

THE Stock Exchange air is full of rumours, expectations, and discussions, in regard to the political outlook which is now so closely associated with the financial position. Towards the end of last week, a number of well-known industrialists, to use the popular word, issued a manifesto in which a definite move is proposed towards the adoption of steps that might lead to resuscitation of trade. There are rumours that the formation of a Coalition Government is in contemplation, and the result of the various uncertainties with which the air is at present charged is to restrain investment from enterprise in any save the gilt-edged securities. Markets have been very flat, not only in this country, but in the United States as well.

The G.E.C. Debenture Issue.

The General Electric Company has issued, this week, its prospectus of 3½ million pounds of 5 per cent. mortgage debenture stock, offered at 98. The security of the stock is undoubted, and the success of the issue was practically assured from the start. Subscription-lists closed promptly. Holders of the 7 per cent. mortgage debenture stock can, however, exercise their right of conversion up to next Monday, September 29th, so that the allotments cannot be expected until about Thursday in next week. The price of the ordinary shares is unchanged at 48s. 3d. The new debenture stock will yield £5 2s. per cent. on the money, without taking into account repayment, at £100, by September, 1967, at latest.

Other Gilt-edged Stocks.

County of London Electric Supply Company has an issue of 7 per cent. redeemable debenture stock, which can be repaid on or after April next year at 100. There is on offer £1,000 of the stock at 104½, which yields £6 14s. per cent. outright, but no more than £4 12s. per cent. assuming redemption will take place at the earliest time just mentioned. County of London 5 per cent. debenture stock costs 102½, at which the return is £4 17s. 3d. per cent. This is repayable at 100 after 1972; the company has the right to redeem it, also at par, after 1965. The gilt-edged stock available in this section has mostly been absorbed. There remains £5,000 North-West Midlands Joint Electricity Authority 5 per cent. 1950/1970 provisional scrip, available at 101½, free of stamp and fee. The return is £4 18s. 3d. per cent. on the money, and interest payments are due on the 1st of January and July. The stock runs to 1970, by which time it must be paid off at 100, but the Authority can redeem it after 1950 at the same price. For Central Electricity Board 5 per cent. stock, 1950/70, 102½ free of stamp is asked, giving a return of 4½ per cent., and with March and September interest. The repayment dates are the same as those of the North-West Midlands Authority. Edmundsons' debenture has risen to 3 premium. Newcastle-on-Tyne debenture is a good market at 5 premium.

South Wales Electric Power.

Of somewhat different class, as the yield on the money of £6 2s. per cent. suggests, £1,250 South Wales Electric Power Distribution 5 per cent. debenture stock can be obtained at 82. This is irredeemable. The interest service requires £14,635 per annum, against which last year's profits showed that there was £44,000 available. The industrial condition of South Wales is, of course, a factor to be considered in relation to this investment. A bond whose price continues steadily to advance is the 6 per cent. first mortgage of the Tokyo Electric. Of this, £5,000 bearer bonds can be obtained at 95½, yielding £6 6s. per cent. on the money outright, and £6 8s. per cent. allowing for redemption. The interest requires 1½ million pounds per annum, and last year there was over 6 million pounds available to meet it.

Home Railway Stocks.

The excitement aroused by the rumour that the Metropolitan Railway is on the point of being taken over by the Underground Electric Railways of London subsided rapidly enough after the denial, mentioned here last week, that any immediate step is contemplated. The price of the ordinary stock, which had risen from 68 to 75, reacting to 71, has further declined to 68½. Districts have gone back to 75, and Underground Electric shares to 23s. 6d. On the other hand, a little demand came in for the assented ordinary stock of the Central London Railway, and the price responded with an improvement of a point to 78.

London Tramways and the Traffic Pool.

It deserves to be noticed that the shares in the London tramway companies are beginning to creep up in price. These so very seldom move at all that any sign of life is immediately fixed upon as affording possible indication of the formation of that comprehensive traffic pool which is generally supposed to be the object of the Underground Electric Railways of London. A pool does already exist, of course, but this applies to the electric railways and to the London General Omnibus Company, the tramways standing outside the circle. If the trams were to be brought within it, then the pool would be almost complete. London and Suburban Traction preference have strengthened to 10s., the ordinary to 2s. 6d. London United 5 per cent. preference have

risen to 4s., and several slight improvements occurred. The desired pool will not be entirely whole until the Metropolitan Railway is brought into it.

Metropolitan Railway and Underground Electric.

Inclusion of the Metropolitan, greatly as it must be desired by the Underground Electric Railways of London, would carry with it, as things are at present, the responsibility for the Tube Combine to shoulder the Metropolitan Railways extension services which run into the country. These can hardly be of any particular service—under present conditions, at any rate—to the Tubes, whose main object is to secure density of traffic. It is easy, bearing these facts in mind, to understand the reluctance to pay what might be regarded by the Underground group, though not by the Metropolitan, as a fancy figure in return for the Metropolitan's undertaking. One day, there will no doubt be a fusion of interests. In the meantime, the holder of Metropolitans is content to take his yield of nearly 6 per cent. on the money from a stock in a company which is always extending, and whose ultimate future is likely to be bound up with the Tube Combine.

Home Electricity Supply.

Charing Cross ordinary shares strengthened to 28s., and Urban ordinary to 28s. 9d. Chelsea ordinary receded to 27s. These movements make up the sum total of the alterations on the week in this particular group. Business is unusually quiet, but it must be admitted that there is nothing very much to encourage activity. Prices may be said to stand at practically their proper levels in relation to the value of money and of money stocks. The scarcity of supply of shares serves to maintain values; when stock does happen to come to market, no difficulty is experienced in finding a home for it.

Cables and Wireless.

Substantial reductions in cable rates are announced by Cables & Wireless, with the result that prices of the stocks gave way, the 5½ per cent. preference losing 5½ points, with a fall to 74½. The "A" ordinary stock is 4 down at 23½, and the "B" at 12½ shows a drop of 2. It is said that the cable companies have been wanting, for some time past, to obtain permission to reduce their rates in accordance with the plan now proposed, and that this reduction will bring the cable charges to the level of those of the wireless and the beam systems. What the investor-holder of the Cables and Wireless stocks argues is that such material cuts as are now announced will have to be followed by a large accession of business in order to compensate for the lower scale of charges. With markets all round in their present depressed condition, it only needed this announcement to bring about the falls in prices just mentioned. Marconi Marines have gone back to 35s. 9d. Globe Telegraph ordinary are unchanged at 15¾, and the 6 per cent. preference at 10¾. The only movement in the telephone group is a fall to 48s. 9d. in Oriental Telephone ordinary shares. American Telephone & Telegraph went back to 217½, Internationals to 40½.

Dollar Stocks.

New York has been suffering from further spasms of flatness, with the result that most of the popular shares have given way. The chief falls occurred in the high-priced utility and railroad shares, but the same tendency ran through the whole list, and affected Canadians as well as United States issues. Shawinigan Water, for instance, have gone to 69, and Power Corporation of Canada shares to the same price. Pennsylvania Water & Power capital stock weakened to 75½. Canadian General Electric preference remain unchanged at 63. Brazilian Tractions went up to 38½ before reacting to 35½. The Mexican group retains its firmness, British Columbia Power "A" at 39 and the "B" at 15 are neglected. Hydro-Electrics are at 37½.

Material progress has been made in the recovery amongst Anglo-Argentine Tramway issues. The company's 5 per cent. debenture stock at 61 is five points higher than it was a fortnight ago. The first preference shares, which dipped to 37s. 6d. earlier in the month, are now up to 50s., and the second preference have recovered to 40s. For these improvements the principal cause was a little buying that followed upon the news respecting the quiet manner in which the revolution had been carried out.

Manufacturing and Equipment.

Prices in the section for the shares of manufacturing companies show a dwindling disposition, and this has reduced the improvements that occurred during the past two weeks. Henleys, which went up, it may be recalled, from 5⅞ to £6, are back to 5¾. British Insulated ordinary shares are weak at 3⅝, Associated Electrical Industries gave way to 24s. 6d. Callenders have eased off to 3⅜. Dealers say that there is not a great deal of stock coming to market, but that, on the other hand, they have few fresh buyers willing to take what is offered. Philips Lamps are back at 50s. 6d.; Sofina have drooped to 2⅜.

Of the lower-priced shares, English Electric preference at 8s. 9d. show a fall of 2s. 6d. Nor is there any recovery to be observed in iron, coal, and steel shares. Babcock & Wilcox at 53s. 9d. are 1/16 down: Vickers keep tolerably steady at 7s. 9d. There has been no fresh development amongst rubber shares, where the maintenance of the price of the raw produce at 4d. per lb. seems to have laid a weight upon business.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1928.	1929.	Price Sept. 23 1930.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	58/9	—	5 2 0
Brompton Ordinary	1	8½	8½	26/6	—	5 5 8
Charing Cross Ordinary	1	8½	8½	28/-	+6d.	5 0 0
do. do. 4½% Pref. ...	1	4½	4½	18/-	—	5 0 0
Chelsea	1	8½	8½	27/-	—6d.	5 3 9
City of London	1	10	10	33/9	—	4 8 1
do. do. 6% Pref.... ...	1	6	6	23/6	—	5 2 2
Clyde Valley	1	8	8	27/6	—	4 5 4
County of London	1	7	10	46/9	—	4 5 6
do. do. 6% Pref.... ...	1	6	6	23/6	—	5 2 2
Edmundson's 7% Pref.	1	7	7	24/-	—	5 16 8
Elec. Supply Corporation	1	11	11	47/-	—	4 13 7
Kensington Ordinary	1	8	8	27/-	—	5 3 8
Lancs. Light and Power	1	7½	7	24/-	—	5 16 8
London Electric	1	8½	9	30/-	—	4 13 4
Metropolitan	1	9	10	2 1/16	—	4 17 1
do. 4½% Pref.	1	4½	4½	17/-	—	5 6 0
Midland Counties	1	6½	7	28/6	—	4 18 3
Mid. Elec. Power	1	15	8	30/-	—	5 6 8
Newcastle-on-Tyne Ordinary ...	1	6	6	23/9	—	5 1 1
do. 7% Pref.	1	7	7	27/-	—	5 3 8
Notting Hill 6% Pref.	10	6	6	10½	—	5 11 4
North Met. Elec. 6% Pref.... ...	1	6	6	23/6	—	5 2 2
St. James' and Pall Mall	1	8	8	27/6	—	5 1 10
Scottish Power	1	8	8	28/6	—	5 12 4
South London	1	8½	8½	27/-	—	5 8 8
Urban Ordinary	1	7	7	28/9	+1/16	4 17 5
Westminster Ordinary	1	8½	8½	27/6	—	5 1 10
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	31/3	—	5 2 5

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	78	+1	5 2 7
Metropolitan	,	3½	4	68½	—2½	5 16 10
do. District	,,	4	5	75	—½	6 12 5
Underground Electric	£1	7	8	23/6	—1/-	6 16 2
do. do. Income ...	Bonds	6	6	104	—	5 15 5

TELEGRAPHS AND TELEPHONES.

Anglo-Am. Tel. Pref.	Stock	6	6	101	—	5 19 0
do. Def.	,,	1½	1½	25	—	6 0 0
Automatic Telephone	1	10	12½	31/3	—1/16	7 18 10
Cables & Wireless 5½ Pref.... ...	Stock	—	5½	74½	—5½	7 7 8
do. A 7½ Ord.	,,	—	23½	23½	—2	... ...
do. B Ord.	,,	—	—	12½	—2	... ...
Globe Tel. and T. Ord.	10	10	10	15½	—	*8 7 6
do. do. Pref.	10	6	6	10½	—	5 11 7
Great Northern Tel.	10	20	20	30	—	6 13 4
Marconi-Marine	1	19½	15	35/9	—1/9	8 8 6
Oriental Telephone Ord.	1	12	12	2 7/16	—⅛	*4 18 4

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	2½	+⅛	11 0 0
do. do. 2nd Pref. ...	5	6	6	2	+¼	15 0 0
do. do. 5% Deb. ...	Stock	5	5	61	+2	8 4 0
British Electric Traction Def. Ord.	,,	5	5	1475	—	... ...
do. do. Pref. Ord'	,,	8	8	123½	—	6 6 6
Brazil Traction	100	7	8	35½	—1½	5 12 8
Brit. Columbia Elec. Rly. Pcc. ...	Stock	5	5	91½	—	5 9 8
London & Sub. Trac. 6% Pref. ...	1	Nil	Nil	10/-	+1/-	... ...
London United Tram Deb. ...	Stock	4	4	52½	—	7 12 4
Mexico Trams, 5% Bonds	—	5	5	57	—	8 15 6
Mexican Light Common	100	Nil	Nil	69½	—	... ...
do. 7% Pref.	100	7	7	76½	—	9 3 0
do. 1st Bonds	—	5	5	80	—	6 5 0
Victoria Falls Ord.	1	15	15	3 3/16	—	4 19 0
Yorkshire (West Riding)		Nil	Nil	5/-	—	... ...

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	6	24/6	—6d.	4 18 0
Babcock & Wilcox	1	13	15	53/9	—1/16	*5 11 6
British Aluminium Ord.	1	10	10	2	—	5 0 0
British Elec. Transformer Pref. ...	1	7	7	8/9	—	... ...
British Insulated Ord.	1	15	15	3⅝	—1/16	4 2 8
Brush Ord.	Stock	10	10	110	—	9 1 10
Callenders	1	15	15	3⅜	—1/16	4 9 0
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Parkinson Ord.	5/-	—	80	23/9	—	6 6 4
do. 8% Pref.	1	8	8	25/9	—	6 4 3
Edison-Swan 1st. Pref.	1	7½	7½	26/3	—	5 14 3
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	5½	5	12/-	—	8 6 8
Enfield Cable Ord.	1	20	25	4½	—	5 17 8
English Electric	1	Nil	Nil	12/6	—	... ...
do. do. Pref.	1	8	Nil	8/9	—⅛	... ...
Gen. Elec. Pref.	1	6½	6½	28/9	—	5 9 5
do. Ord.	1	10	14	48/3	—	5 16 2
Henley	1	25	30	5¾	+⅛	5 2 0
do. 4½% Pref.	5	4½	4½	4¾	—	5 6 0
India-Rubber	1	Nil	Nil	7/6	—	... ...
Johnson & Phillips	2	10	10	1⅝	—	5 6 8
Siemens Ord.	1	7½	7½	23/9	—	6 6 4
Telegraph Construction	12	10	10	19	—	*8 6 7

* Dividends paid free of Income Tax.

Our Foreign Electrical Trade.

Electrical Exports and Imports during August.

THE August Board of Trade returns of exports from and imports into this country show that a very large decline occurred in both directions —about 30 per cent. in the case of exports and 20 per cent. in imports. In these decreases electrical goods and machinery shared, and so far as exports were concerned, the fall was proportionately greater than the general decline; in fact, the total was the lowest recorded since June, 1926. All the leading export lines contributed to the decrease from the July figures except batteries and accumulators, and meters and instruments, which were higher by £3,927 and £2,581, respectively. The telegraph and telephone section as a whole recorded a decrease of £129,469, while exports of electrical machinery were £88,776 lower. Cable exports also fell considerably—by £77,366. As compared with August, 1929, the decrease was even larger—£433,158—due mainly to smaller shipments of telegraph and telephone apparatus (£228,007 decrease) and insulated wires and cables (£88,868 decrease). The position with regard to electrical machinery was not so serious, the net decrease being only £20,979. Batteries and accumulators, however, showed a fall of £20,305.

The import total remained practically stationary at the July level, although there were some wide variations in the individual items. While imports of unenumerated goods, batteries and accumulators, and telegraph and telephone apparatus, were over £20,000 higher in each case, declines of more than £20,000 were shown against insulated wires and cables and electrical machinery. In comparison with August, 1929, there was a decline of £106,426 in the total which was attributable principally to lower imports of telegraph and telephone apparatus and electrical machinery. There was, however, a rise of £74,539 in the case of meters and instruments.

The re-export section again showed an increase as compared with the corresponding month of last year, and the total for the first eight months of the year is about a quarter of a million above the corresponding figure for 1929. Exports show a decline of nearly half-a-million for the eight months, while imports are over £900,000 above the 1929 figure.

As usual, we have prepared a table (inset) showing how our electrical machinery exports were distributed during August. The outstanding feature of this is the rise of £55,999 in the value of shipments to European markets.

Destination.	Quantities. Aug., 1929. Tons.	Aug., 1930 Tons.	Inc. or dec Tons.	Values. Aug., 1929. £	Aug., 1930. £	Inc. or dec. £
Europe	379	738	+359	80,273	136,272	+55,999
Japan	63	18	− 45	11,267	3,355	− 7,912
South America ...	336	146	−190	61,868	24,099	−37,769
South Africa ...	250	223	− 27	37,322	28,150	− 9,172
British India ...	635	690	+ 55	101,498	98,284	− 3,214
Australia	573	418	−155	83,306	62,729	−20,577
New Zealand ...	291	96	−195	36,295	13,643	−22,652
Canada	241	355	+114	30,552	44,617	+14,065
Other countries ...	473	455	− 18	73,035	83,288	+10,253
Total ...	3,241	3,139	−102	515,416	494,437	−20,979

Europe has now succeeded India as the leading importer of British electrical machinery. Since the commencement of this year Europe's share of the exports has amounted to £956,565, and India's to £792,465. The corresponding figures for 1929 were £791,537 and £996,560, respectively. It should be pointed out that while there was a decline of £3,214 in the value of India's imports of British electrical machinery during August, the weight actually rose by 55 tons. It is satisfactory to note that Canada further increased her share of the trade. On the whole, the "unit" value of the exports was practically the same as in August, 1929 (£158 against £159 per ton), but there were some large variations in one or two individual cases.

	Exports. Electrical exports for Aug., 1930.	Inc. or dec. as compared with July, 1930.	Inc. or dec. as compared with Aug., 1929.	Imports. Electrical imports for Aug., 1930.	Inc. or dec. as compared with July, 1930.	Inc. or dec. as compared with Aug., 1929.	Re-Exports. Electrical re-exports for Aug., 1930.	Inc. or dec. as compared with July, 1930.	Inc. or dec. as compared with Aug., 1929.
Electrical goods and apparatus (unenumerated)	£216,066	−£45,644	− £48,837	£144,768	+ £23,773	− £16,056	£32,593	+ £21,405	+ £22,391
Insulated wires and cables ...	181,868	− 77,366	− 88,868	64,773	− 26,420	− 7,497	204	− 1,036	− 532
Glow lamps	43,739	− 38,609	− 22,705	53,984	− 18,453	− 644	529	+ 80	+ 297
Arc lamps and parts	1,478	+ 626	+ 871	1,827	+ 715	+ 337	—	− 553	− 20
Batteries and accumulators ...	67,096	+ 3,927	− 20,305	61,158	+ 21,234	− 8,341	517	+ 359	− 2,510
Meters and instruments ...	31,733	+ 2,581	− 2,483	95,787	− 5,764	+ 74,539	4,734	− 3,886	+ 4,023
Carbons	1,372	− 905	+ 486	14,912	+ 142	+ 7,167	708	+ 46	+ 501
Switchboards (not telegraph or telephone)	4,583	− 3,925	− 2.331	504	+ 452	+ 504	—	—	− 15
Electrical Machinery—									
Electrical machinery (unenumerated)	309,459	− 33,499	− 26 547	119,963	− 21,057	− 57,708	16,853	+ 3,407	+ 9,543
Railway and tramway motors	11,506	+ 2,129	− 6 229	—	—	—	—	—	—
Other motors and generators...	173,472	− 57,406	+ 11,797	—	—	—	—	—	—
Telegraph and Telephone Cable and Material—									
Telegraph and telephone wires and cable (not submarine)	61,136	− 5,623	− 25,800	1,673	+ 350	− 588	—	—	− 2,0.0
Submarine telegraph and telephone cable	144	− 6,502	− 94,522	—	—	—	—	—	—
Telegraph and telephone instruments and apparatus ...	141,945	− 117,344	− 107,685	82,511	+ 25,234	− 98,139	11,574	− 8,930	+ 5,809
Totals...	£1,245,597	−£377,560	− £433,158	£64',860	+ £206	−£106,426	£67.712	−£10,892	+ £37,107
Increase or decrease for first eight months of 1930			Exports −£480,744			Imports + £911,335			Re-Exports + £248.059

The British Association.—III.*

A general account of the meeting of the British Association for the Advancement of Science at Bristol.

High Pressures and Temperatures in the Generation of Electricity.

In opening the discussion on Mr. G. A. Orrok's paper, summarised in the ELECTRICAL REVIEW of September 19th, 1930, **Sir Ernest Moir** (President, Section G), after thanking Mr. Selvey for having presented the paper, said that the economy of electricity supply financially was a matter of very great importance. We got along after the Napoleonic wars by an increase in our coal exports, but now we must turn our very cheap coal into electrical energy at a reasonable rate; the use of higher steam pressures was a step in that direction.

Dr. G. C. Stoney, F.R.S., said the author had shown in his paper that doubling the pressure gave a saving of about 1,000 B.th.u. Therefore, a 15 per cent. rise of pressure would save 200 B.th.u. per kWh. That was the same again as would be given with 100 deg. F. rise of temperature. A 15 per cent. rise of pressure was from 500 to 575 lb., or from 650 to 750 lb., and 100 deg. rise of temperature was from 750 deg. F. to 850 deg. F. 750 deg. F. was about the limit of what mild-steel superheater tubes would stand, and above that troubles from creep and corrosion, &c., were met. It was very easy to see whether it was preferable to increase the temperature or the pressure from an engineering point of view. There was no difficulty in increasing the pressure if we were dealing with mechanical stresses only, but with high temperature there were troubles from corrosion, creep, expansion, and consequent distortion. Again, with very high temperatures there were distortions in the turbine, and the clearances had to be increased to enable the blades to run safely. Thus the advantages due to high temperature were to a certain extent discounted. His own experience had been that most of the troubles in turbines were due to temperature. Such pressures as were being dealt with in steam were quite low in hydraulic work, and yet there were practically no troubles there. If the temperature of steam was reduced, the wetness in the exhaust was increased, with consequent erosion of the low-pressure blades, but he was convinced that this could be dealt with effectually by draining the turbine and having suitable materials and design in the last rows of blading.

Prof. F. C. Lea said that those who had visited the United States apreciated the abundant kindness of American engineers in showing everything they were doing in the matter of higher steam pressures and temperatures. At the present time we were attempting to get as near the Carnot cycle as possible in turbines by bleeding, although at one time some engineers regarded the Carnot cycle as a figment of mathematicians. As regards temperature, there was a danger in increasing it too rapidly. Mild steel at 800 deg. F. would be safe, but it was important in the case of superheaters that there should be no local heating, and the temperature must not be allowed to get beyond 900 deg. F. locally, or there would be greater danger of failure. The problem with new steels was the technique of working them. In the case of superheaters, it was easy to weld the material, but in the case of some of the steels which would stand higher pressures, there were considerable difficulties in the manufacture of the superheater elements that had not yet been entirely overcome. For this reason we should not push temperatures too high until we had obtained materials which had a limiting creep stress much higher than that of mild steel. The difficulties of erosion could be got over by using some of the alloy steels, already available, in the low pressure end of the turbine, for instance, the high nickel and chromium steels, because there was not the same difficulty in making turbine blades of these materials that there was in making superheater elements.

Dr. John Morrow thought the trend of the discussion was in favour of increasing pressures rather than temperatures, and from the purely thermo-dynamic aspect it appeared that an increase of pressure was the most advantageous.

Mr. W. M. Selvey, in reply, said that the engineer's point of view on this question of temperature and pressure was not a question of their value *per se*. The engineer wanted to get on, and wished to know what was holding him back. If pressure was a good thing, could he have too much of it? If he could, where was the limit at which he should stop? The same applied to temperature. In taking that viewpoint, the engineer had forced his colleagues concerned with materials to make progress which otherwise might not have been made. New materials were undoubtedly wanted. It might be known to a good many that Prof. Herzfield, under the guidance of Mr. Dow, had put into the American station at Gilray an experimental superheater for operation at 1,000 deg. F. Experiments had been carried out on that for over a year, and as a result of this and other work we knew perfectly well the kind of material which had a yield point or creep stress well within the requirements. As Prof. Lea had mentioned, however, that material was very difficult to draw into tubes, and, further, it was necessary to have tubes longer than could be drawn. That necessitated jointing lengths together, and welding difficulties arose there. At the same time, it had been stated that such material could be welded. The question of erosion was solving itself on account of size. Erosion was serious in the case of small blades, but, with blades 2 or 3 ft. long, 3 or 4 inches across, and ¼ inch thick, the surface erosion was very much less. Moreover, the increasing purity of water was also playing a part in reducing erosion.

* Parts I and II appeared in the ELECTRICAL REVIEW of September 12th and 19th, 1930.

Report of Committee on Electrical Terms.

At the final meeting of Section G on September 10th the report of the British Association Committee on Electrical Terms and Definitions was submitted by Professor F. G. Baily in the absence of Professor G. W. O. Howe.

It was pointed out that great difficulty had been experienced in getting agreement upon some of the definitions and units used in electrical engineering, and this difficulty had been traced to lack of precision in the definitions of the three fundamental quantities, namely, electro-static quantity, magnetic pole, and electric current. The International Electro-Technical Commission, it was mentioned, had been dealing with the definitions of the practical units in electro-technics, and had also experienced the same difficulties as those met with by the British Association Committee. As, however, at least one of the members of the British Association Committee was also a member of the International Electro-Technical Commission, the matter was being discussed between the two bodies, whilst during his visit to Bristol, Professor Kenelley, of America, had also been conferred with on the matter and had been co-opted as a member of the British Association Committee. It was, therefore, recommended that the Committee should be re-appointed as a link between the other bodies dealing with the difficulties. At the same time the Committee proposed to submit a technical report suggesting a revision of the fundamental definitions of electrical science. This, said Professor Baily, involved international co-operation between physicists and engineers, and he concluded by suggesting that the centenary meeting of the British Association in London next year might afford a suitable opportunity for the discussion of the subject.

The report and the recommendation that the Committee be re-appointed was adopted.

Visit to Yeovil.

Members of the Engineering Section on September 9th visited the works of Petters, Ltd., Yeovil. The party, which numbered about 30, arrived at 3 p.m. and were received by Sir Ernest W. Petter, the chairman of the company, and Mr. Percy W. Petter, vice-chairman. The visitors were conducted through the engine works, passing through the power house, foundry, machine and erecting shops, atomiser and calibrator department, and painting and dispatch departments, where they had an opportunity of inspecting the processes and system of manufacture of internal-combustion engines in sizes up to 400 b.h.p. for industrial and marine purposes.

To provide power and light for running the works, the power house is equipped with engines made by the firm, totalling 1,900 b.h.p., and the electrical output is about two million kWh per annum. The foundry is said to be the largest in the South of England, and it is laid out and equipped in accordance with the latest foundry practice.

The visitors were then conducted round the aircraft works, where they were enabled to see the Westland aircraft in all stages of its manufacture. The departments consist of the main component shop, dope and covering shops, woodmill, and erecting and detail shops. An extensive aerodrome adjoins the works.

The Centenary Fund.

Upon the occasion of the centenary of its foundation, which will be celebrated in London next year, the British Association aims at raising a fund of £40,000 which will not only cover all the necessary and desirable expenditure in connection with the Centenary Meeting, but will also assure for the future an adequate financial basis upon which to develop and extend its approved activities. Contributions to the fund should be sent to the General Treasurer, British Association, Burlington House, W.1.

Recent Lighting Developments.

Notes on the installations at the Brighton Aquarium; The People's Palace, Mile End Road; Messrs. Maple's new building, Tottenham Court Road; and at St. Benedict's Church, Birmingham.

The Brighton Aquarium.

BRIGHTON Aquarium was opened to the public as far back as 1872. It has, however, recently been reconstructed, and to-day it ranks, it is claimed, as the largest and most famous aquarium in the world. The modern aquarium lends itself to good lighting, and the various rare exhibits at Brighton may certainly be inspected under the most favourable lighting conditions. The lighting throughout provides a really fine example of modern decorative treatment, and it furnishes evidence of the possibilities of introducing artistic effects by means of fittings fashioned of real-bronze metalwork, an essential requirement for the lighting of buildings exposed to sea-air conditions. In this installation the exterior bronze work has been left to tone itself naturally, while the bronze of the lighting fittings inside has been finished by a special spraying process of cellulose enamel.

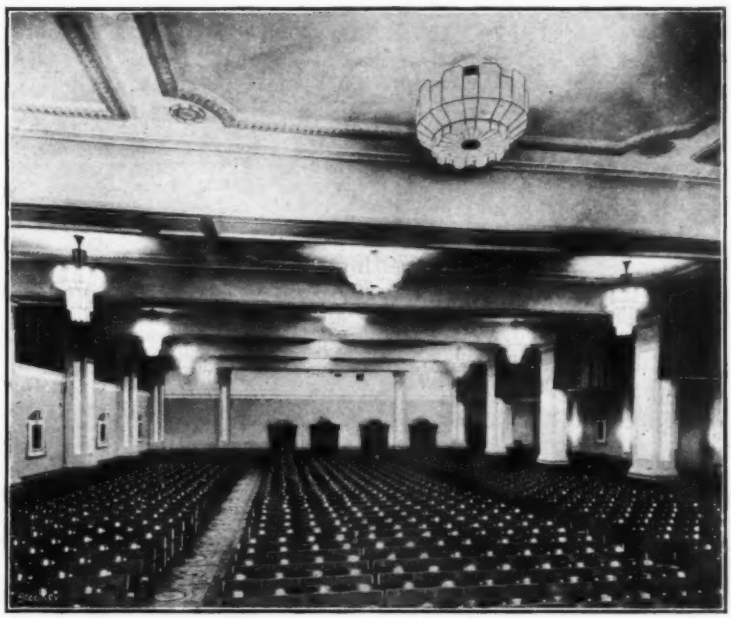


Fig. 1.—Public Hall, Brighton Aquarium; Panelled Glass Fittings.

Some forty-three massive columns surmounted by hexagonal panelled lanterns of intriguing design have been supplied for the exterior lighting of the new promenade and entrance. These are mounted on the stone balustrade, and give a dignified and pleasing effect, combined with efficiency. The main court entrance is provided with specially designed hexagonal lanterns mounted on wall brackets, adding very considerably to the architectural effect. The collonade has a number of half-hexagonal lantern units mounted on the exterior of the columns, while the interior is illuminated by means of heavy bronze fittings supporting large "Equiluxo" glass hemispheres.

The inside of the Public Hall reveals a striking decorative colour scheme, and the lighting fittings, which are of modern, yet delicately refined, proportions, give a sense of being a permanent part of the whole ensemble, fig. 1. These units consist of five 4 ft. 6 in. corona fittings arranged in the centre, and ten smaller units, each 3 ft. in diameter, are ranged along the sides. This lighting is supplemented by a number of wall brackets for purely local lighting, the modern type of glassware giving perfect effects. Portico lighting is contrived by lanterns of similar design to those referred to, suspended from the ceiling Four double-tier modern lighting pendants which are suspended from the ceiling are used for the lighting of the foyer. These double-tier fittings, each of which measures some 24 in. in diameter, are pleasingly effective.

Fig. 2.—Tank Corridor, Brighton Aquarium; Hexagonal Panelled Pendants.

Fig. 3.—Illumination in St. Benedict's Church, Birmingham.

In the tank corridor the main lighting is by means of 12-in. diameter hexagonal panelled pendants, with tinted seaweed design glassware, to give the correct atmosphere in this very

Fig. 4.—Large Electroliers in Winter Garden of "The People's Palace," London.

important area, fig. 2. The entrance from the Terrace, Madeira Drive, &c., is illuminated by some twenty ceiling

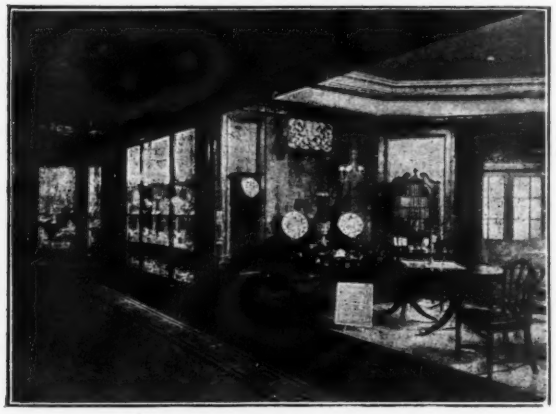


Fig. 5.—Arcade Windows of Messrs. Maple's New Building, London.

fittings, also of hexagonal design, of two dimensions, 15-in. and 18-in. diameters, and glazed very attractively with a modern form of glassware. The staircase is illuminated along similar lines by pendant and bracket units, and double- and treble-tier hexagonal pendant and bracket fittings used in the vestibule are designed to match with sea motif design panels, and to introduce a realistic aquaria effect. There are two well-appointed restaurants, the principal one being lit by eight 32-in. modern-style fan designed panels. On the walls and columns are installed some twenty special matching bracket lighting fittings which dispense a fine illuminated effect all around. In the smaller restaurant there is a number of 18-in. square panelled fittings with wall brackets to match. Here the units are of tango tinted panelled glassware, and with their accompanying green suspensions they provide an artistic effect exceedingly pleasing in character.

Reference should be made to the very elaborate G.E.C. stage-lighting apparatus that has been installed, three full-size battens, each some 30 ft. long for stage-lighting purposes, being fitted above the stage of the Public Hall, so that theatrical plays, concerts, or other productions may receive their full quota of up-to-date stage lighting. The whole of the lighting units to which reference has been made in these notes were specially designed and manufactured by the General Electric Co., Ltd., and the scheme was carried out to the designs of the Brighton Corporation Engineers' and Surveyors' Department, under the supervision of Mr. D. Edwards, M.Inst.C.E., and Mr. R. A. Barber, architect. Messrs. Pinching & Walton, Ltd., were the electrical contractors.

Winter Garden, "People's Palace."

An interesting installation recently carried out is that in "The Winter Garden" of "The People's Palace," Mile End Road, where five electroliers are employed for the decorative lighting to replace the "Striplite," which has been condemned, fig. 4. The new fittings take the form of two bands, one above the other, the upper one being 8 ft. in diameter, and the lower one 4 ft.. The bands are held together by eight ornamental straps, which finish with a finial at centre bottom. For suspension eight chains are carried from hooks on the upper band to a centre body from which a single chain is carried to the roof. The lighting is obtained from 73 lamps in three colours, amber, blue, and red, 43 lamps being on the top band, 24 on the lower one, and one at the finial. The fittings harmonise with the steel structure of the building and give a very pleasing effect. Their weight is over 4 cwt. each, and they were designed and manufactured by Messrs. Falk, Stadelmann & Co., Ltd. The electrical contractors were Messrs. G. A. Weston.

Shop-window Lighting.

The proprietors of large stores and shops who are still unaware of the advances that have been made in shop-window lighting would do well to inspect the windows of Messrs. Maple's new building in Tottenham Court Road. The most impressive feature of this lighting is its unobtrusiveness. The installation, which was designed for Messrs. Maple's by the illuminating engineers of the Edison Swan Electric Co., Ltd., in conjunction with the architect, employs "Jack"- and "Jill"-type X-ray reflectors in the arcade windows, and it is noteworthy that, in addition to it being practically impossible to see the reflectors from outside the windows, no reflection of the lighting equipment can be observed in the plate glass. This effect is achieved by a special method of fixing the reflectors. They are carried on battens suspended in the ceiling trough by means of rods

Fig. 6.—Roof Lighting in P.M. Church, Reading.

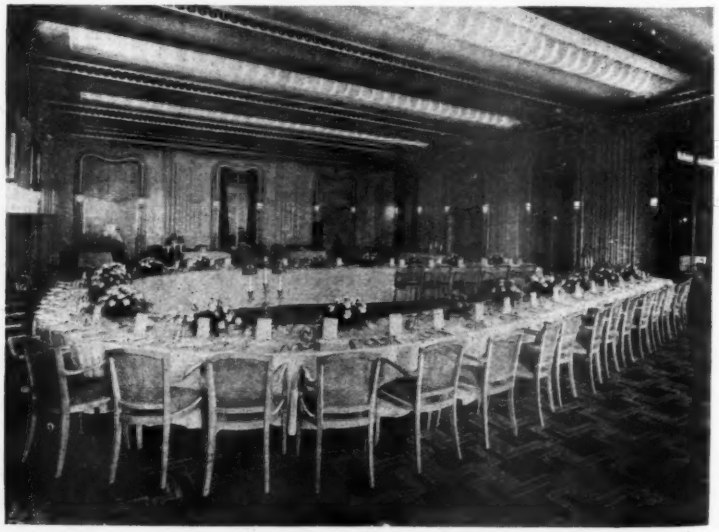


Fig. 7.—The "Empire Room" in Trocadero, London.

to which they are shackled. This arrangement, in addition to ensuring that the reflectors are carried at the correct height from the floor, allows the complete bank to be taken down *en bloc*, should it be necessary, with the greatest of ease.

For the lighting of the outside windows a new feature is introduced. Owing to the height and position of these windows, it was possible from some angles to see the glare from the lamps in the reflectors. To prevent this X-ray "Anti-glare" shields are fitted which, while they do not, it is claimed, diminish the lighting efficiency of the units, completely obviate that undesirable glare which distracts the attention from the window display. The reflectors used in these windows were "King"-type X-ray units, and this is the first occasion in England on which these new "Anti-glare" shields have been employed. Fig. 5 is a view of the arcade windows.

A New Fitting.

Philips Lamps, Ltd., have recently introduced a new commercial diffusing unit, fig. 8, of original design which incorporates several improvements in fixing methods. No screws or fixing points are necessary. The shade carrier has been replaced by a plate bearing the globe, and a parabolic-shaped plate covers this and enhances the globular appearance of the fitting. No adjusting device for the lamp is necessary. The normal lamp used is of 200 watts, but the fitting is designed to take lamps of from 150 to 500 watts, inclusive. The finish is nickel-plate on copper, and the globe is made of "Philips" three-ply "Phililite" glass, type D.I.L.35. This fitting is supplied in only one size—suspension 20 in., globe diameter 14 in. Edison screw lamp-holders are fitted as standard, but "Goliath" holders can be supplied, if desired.

Fig. 8.—"Philips" Type D135 Fitting.

Church-lighting Schemes.

Another interesting electric lighting scheme has been recently installed at the Primitive Methodist Church, London Street, Reading, by Messrs. A. J. B., Ltd. The illustration, fig. 6, which is taken from an actual untouched night photograph, shows the excellent results obtained, which represent a remarkable improvement over the previous lighting by means of chandeliers from the centre of the roof. The building is ideally constructed for the form of lighting employed, as a double row of roof lights were available. The installation consists of 18 "Benjamin" concentrating-type reflector fittings, each equipped with 300-watt gasfilled lamps, one fitting being mounted directly over each of the roof lights. Underneath the gallery No. 5890 "Bencolite" units are employed. A general intensity of 6.3 foot-candles is obtained, and the light is very evenly distributed.

No better proof of the fact that illuminating engineering is a highly specialised business can be found than in the case of St. Benedict's Church, Birmingham. In designing this church, the architects requested a lighting system which should be in complete harmony with the severely simple interior. Some form of concealed lighting was clearly necessary. Considerable expense was incurred in experimental work before the Illuminating Engineering Department of the Edison Swan Electric Co., Ltd., was consulted. There was no scope behind the roof principals for the concealment of lighting troughs, and accordingly the company evolved two alternative schemes: the location of projectors in the clerestory apses, and the provision of units recessed in the barrelled ceiling.

The latter scheme was decided upon, as it had the two-fold advantage of lighting the side aisles as well as the nave, and also of providing easy access to the units from above the roof for maintenance. The general lighting of the nave and side aisles is carried out with ten 300-watt lamps in flush ceiling-type units, while two type-455 B.T.-H. projectors are located in the two window apses nearest the altar, in order to effect a higher intensity there.

Supplementary lighting for the mural decoration which forms the altar reredos is accomplished by six "Mirolux" troughs, each trough housing two 60-watt vacuum lamps. The illustration, fig. 3, shows how well these decorations stand out. X-ray reflectors are provided for the lighting of the belfry and small chapel at the east end of the south aisle, and these units, together with the "Mirolux" troughs, are controlled locally, the main roof units and projectors being controlled from the rear of the nave. The contractors for this scheme were Messrs. Ellis & Ward.

New Lighting at the Trocadero.

Something entirely novel, it is claimed, in lighting effects has been devised and installed in the Empire and Alexander Rooms of the Trocadero Hotel, London. The fitting employed comprises hollow fluted-glass tubes approximately ½ in. in diameter, mounted horizontally on almost invisible frames suspended below rows of lamps which are thus obscured from view. The resultant refraction of light produces an illumination in the form of continuous bands—rays, soft and subdued, from which all glare is eliminated. The lighting effect is highly efficient, and at the same time charming and restful, but apart from this, the whole system blends artistically and pleasingly with the modern scheme of decoration. The accompanying illustration, fig. 7, is a view in the "Empire Room," showing the ceiling lights in position and the bands of light produced from a single lamp behind each fitting.

The whole of the fittings were manufactured by the British Central Electrical Co., Ltd., under licence from the patentees.

Indian Communication Notes.

(By Our Indian Correspondent.)

Progress in Telegraphs.

THE annual report on the working of the Indian Posts and Telegraphs Department states that the telegraph and telephone mileage during the past year was increased by several thousand miles of conductors; at the end of the year 102,000 miles of line were maintained by the Department.

The cable mileage comprised 428 miles for telegraph circuits and 645 miles of telephone circuits. During the year 609 miles of underground telephone cables were laid in connection with the opening of new telephone exchanges and also to replace aerial lines. A long-distance telephone line from Surat to Kim and a non-exchange telephone line from Tando Adam to Halu were installed.

Experiments and Improvements.

A new arrangement introducing intermediate offices on phantom telephone circuits, utilising a pair of telephone trunk wires without interfering with the work of the terminal offices on either pair, was developed, and has since been installed at Surat, Broach, and Baroda on the telephone circuits between Bombay and Ahmedabad.

The Baudot system is the principal high-speed system in the Department. One "two-arm" terminal Baudot set was fitted in the Saidpur departmental office and another in the Central Telegraph Office, Calcutta. Composite working was introduced between Delhi and Lahore. Bi-Baudit sets have also been installed in several offices. Foreign communication was also maintained in a satisfactory condition.

A large number of additional trunk telephone circuits was provided during the year. A cordless switchboard which has improved the efficiency of the trunk service was installed at Simla.

Progress in Telegraphy.

With regard to wireless progress, a special short-wave transmitting set with suitable receiver was installed at Karachi, with a view to providing direct communication with Baghdad and Aden in connection with civil aeroplane and airship services. The direction-finding installation at Santa Cruz, near Bombay, was completed and made ready for service.

Two c.w. transmitting sets were obtained for Calcutta and Secunderabad and installed there. Apparatus has also been obtained for a separate receiving and direction-finding station at Calcutta, from which the transmitting sets will be operated by remote control. The c.w. transmitter at Mhow was completed and brought into use. Apparatus was ordered for two new stations and four direction-finding installations acquired for the proposed inland air service between Karachi and Rangoon.

Short-wave Transmission.

Systematic observation of short-wave transmission between Calcutta, Rangoon, and Madras were instituted, and valuable information regarding wavelengths and working conditions were obtained. The coast stations continued to carry out satisfactory communications with ships at sea. Communication was also maintained satisfactorily with Penang and Sabang, through Rangoon, and with Kashgar, through Peshawar. Traffic was passed by wireless between Madras and Colombo on various occasions when the normal routes were interrupted.

The only direction-finding station installation in full operation during the year was Karachi (Malir). A number of ships utilised signals from Diamond Island and other land stations to obtain bearings by wireless with their own direction-finding sets.

Bombay-London Service.

The beam short-wave service between Bombay and London, worked by the Indian Radio Telegraph Company under licence in conjunction with the British Post Office, continued to give satisfactory results throughout the year. There was a steady increase in traffic, principally in the cheaper classes of telegrams, and by the end of the year the service was handling over 70,000 paid telegrams per month.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

A Car-engine Heater.

Messrs. BULPITT & SONS, LTD., Swansea Works, Birmingham, have recently introduced a small electric heating appliance designed to keep automobile engines sufficiently warm to prevent freezing and to ensure easy starting in cold weather. The outer casing is of cylindrical form, as shown in fig. 1,

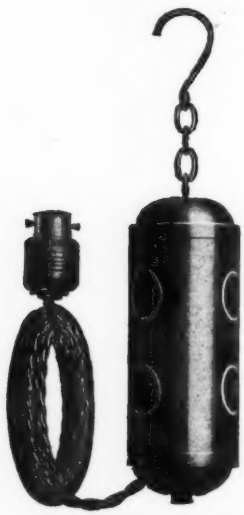


Fig. 1.—" Bulpitt " Car-engine Heater.

and is fitted with copper-gauze vents. The heater is claimed to be perfectly safe in use, and from numerous tests the makers have found that when it is in use petrol may be dropped on to the gauze without danger of fire ensuing. The apparatus is sent out with 12 ft. of flexible lead and a bakelite lamp adaptor, and it can be supplied for two voltage ranges of 200/220 and 230/250.

Overhead-line Inspection Set.

The " Nife " overhead-line inspection set, fig. 2, has been designed and produced by BATTERIES, LTD., Hunt End Works, Redditch, for the inspection of overhead lines at night. It comprises a projector, a nickel-cadmium battery, and the necessary carrying equipment. The reflector, brilliantly plated, is mounted on an aluminium carrying handle, and is fitted with a 5-volt high-candle-power lamp, which, in conjunction with the double switch provided, allows of one filament being switched off when the full light is not required.

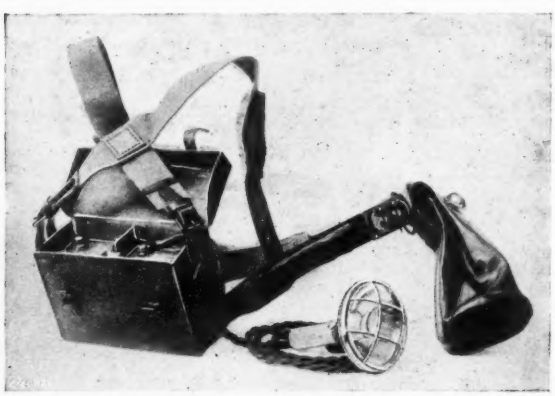


Fig. 2.—" Nife " Line-inspection Outfit.

The bulb and reflector are optically proportioned to give an intense concentrated beam, with the result that small objects are clearly visible at long distances. The battery consists of two " Nife " double cells of 18-Ah capacity connected in series. It is housed in a strong hand-sewn case of good-quality leather, which is, in turn, looped on to a thick leather body belt. In order to distribute the weight for long distances over rough country, the body belt is provided with strong webbing shoulder straps, so that the whole outfit can be carried without inconvenience, leaving both hands free. The battery comes in the small of the back, the two switches are conveniently mounted on the front of the body belt for operation with the right hand, and the flexible from the battery is neatly attached round the edge of the belt. A soft leather bag is also attached to the belt, and the projector and free length of flexible are carried on this when not in use. Instead of the body carrying equipment the battery can be mounted in a wooden case and the projector on a standard of any desired length, with clips for fixing in a vertical position to the battery box; arranged in this way the outfit makes a suitable working light for breakdown gangs at night. The complete outfit weighs less than 15 lb.

A Shielded Tumbler Switch.

We have received from the WANDSWORTH ELECTRICAL MANUFACTURING CO., LTD., Kenyon Street, Birmingham, a sample of its latest tumbler switch, fig. 3, fitted with an internal shield in the form of a moulded red-bakelite disk covering the conducting portions. The words " Danger Do Not Remove "

Fig. 3.—" Wandsworth " Shielded Switch; Cover Removed.

are embossed clearly on the disk, which is fastened to the bridge by means of extended constructional screws and nuts. It is claimed that the shield does not in any way impair the efficiency of the switch, and it constitutes a definite warning to anyone who might be tempted to tamper with the mechanism. It should have a particular advantage for use in bathrooms, sculleries, &c. Standard one-way and two-way patterns are supplied in both the surface and semi-recessed type, in brown (bakelite covers) on white bases or all brown.

A New Shade Gallery.

For use with electric light globes, shades, bowls, &c., Mr. BEN WORTMAN, 12, Cleveland Road, W.12, has produced the " Spedifix " gallery. It is a very simple device; by pressing two pushes, one on each side of the gallery, two internal clips which secure the shade are also pressed inwards, when the shade can be put into position or removed. The pushes are under spring control. The galleries are made in bronze, copper, brass, or oxidised silver, and also in various sizes.

Electric Van for Apparatus Delivery.

The Stoke-on-Trent electricity undertaking, of which Mr. C. H. Yeaman is the engineer, and which has for some years employed electric motor vehicles for the transport of coal and other material from the railway depôt to the power station, has recently put into service an electric van designed for use in delivering electrical apparatus and mains material in the district. The vehicle, which was built by the General Vehicle Co., Ltd., 15, Devonshire Street, Bishopsgate, E.C.2, is fitted with a single motor and a controller giving five forward and two reverse speeds. The power is supplied by a battery of " Tudor " accumulators of a capacity sufficient to allow the vehicle to travel a distance of 40 miles on one charge at a speed on the level of 18 m.p.h.

Association of Public Lighting Engineers.

Report of the Seventh Annual Conference, held in Leicester from Sept. 8th to 11th.

(*Concluded from page* 457.)

Before the resumption of the business proceedings on Wednesday morning, September 10th, the president, accompanied by the Council and a large number of the members and delegates, placed a wreath on the Cenotaph at Victoria Park, Leicester, on behalf of the Association.

"Standard Public Lighting Practice, with Laboratory Experience."

The joint papers on this subject by the Public Lighting Department of the South Metropolitan Gas Co. (presented by **Dr. J. S. G. Thomas** and by **Mr. G. H. Wilson**) were read. The salient features of these papers were brought out in the subsequent discussion. The following table of candle-powers and hourly consumptions of gas burners included in Dr. Thomas's paper will be of interest.

CANDLE-POWERS AND CONSUMPTIONS (INCLUDING BY-PASS).

	Candle power.	Hourly consumption.	
	Candles.	Cu. ft.	Centi-therms.
2 No. 2 in 14 in. Windsor lantern	170	5.5	3.08
3 No. 2 in 16 in. Windsor lantern	250	7.0	3.92
4 No. 2 in South London lantern	370	10.0	5.60
6 No. 2 Cradle lamp	550	15.5	8.7
8 No. 2 Cradle lamp	640	20.5	11.5
Police Traffic Control Points—			
12 No. 2 Cradle lamp ...	960	28.5	16.0
15 No. 2 Cradle lamp ...	1,000	35.0	19.6
High pressure	1,000	20.5	11.5
" "	1,500	31.0	17.4

Mr. S. B. Langlands (Glasgow, past-president of the Association), in opening the discussion, said that recent experiments in his department had shown that a satin (acid) finish was better in every way than a sand-blast finish, as it absorbed less light. Lighting units of the cut-off type were very effective, but the man in the street was dissatisfied if the light source were hidden.

Mr. C. H. Woodward (Bournemouth) suggested the use of a photo-electric cell for exploring the illumination in a street.

Mr. Haydn T. Harrison disagreed with Mr. Wilson's view that the best tests were those carried out in the laboratory, and that by applying the results mathematically to the lighting in the streets one was in a safer position than if the tests were actually made in the streets.

Mr. E. J. Stewart (Glasgow) welcomed the suggestion that there were opportunities for young men to enter the profession *via* the test room. The need for a test room in an independent lighting department did not obviate the need for fully equipped research laboratories on the manufacturers' premises, as the papers had shown. He agreed that final tests should be carried out on the actual street installations. That emphasised the value of a test room, for it could be used not only to check the values of distribution curves, candle-power curves, &c., as given by the manufacturers, but also for the measurement of foot-candle illuminations in the streets and the correction of discrepancies.

Mr. A. E. Jepson (G.E.C.) referred to a recent test of two adjacent sets of standards, with two different kinds of fittings attached, in which the results of the laboratory and street tests were very different. Subsequently it was found that there was a difference of no less than 14 volts as between the two sets of standards; the difference was due to the fact that one was at the beginning and the other at the end of a distribution point. He suggested that the Association should consider very seriously the question of having all illumination expressed in the form of iso-candle curves rather than in the form of maximum illumination, or even hemispherical or spherical candle-powers.

Dr. Thomas, in the course of his reply, agreed with Mr. Langlands that satin finish was preferable to sand-blasting on the inside of glass.

Mr. Wilson was inclined to agree with Mr. Langlands that many people liked to see the light sources, and did not think much of an installation with cut-off units—except, perhaps, where the road surface was extraordinarily bright.

With regard to focussing, he had not found that the filament form affected very much the angle of the maximum intensity from a refractor or reflector. It was rather difficult, however, with different filament forms to decide which was the centre of the filament. He believed that in the revised specification, now under consideration, the maximum difference allowed on light centre length—which was the distance from the lamp cap to the filament—would be about five or six millimetres, which was relatively low, and that should help the matter of focusing considerably. One of the difficulties in using the photo-cell for exploring the illumination in the street was that it was rather sensitive, in the sense that the current it gave was extremely low; with low illuminations the response from the cell was so small that one needed elaborate amplifying apparatus to detect it.

He was sorry if he had conveyed the impression that he tried to control everything from the laboratory. On the other hand, very many manufacturers, or suppliers, or public lighting authorities were asked to tender for or to erect an installation of a certain class of the B.E.S.A. specification. There were two methods of doing that, *i.e.*, to string up lamps in the street and take measurements in the street, or to obtain the data on the units, and design the installation in the laboratory, and then to erect it to the designed conditions and check it in the street. He regarded the second method as being by far the better. It was doubtful if many people in this country had taken a rated test of illumination in the street in accordance with the British standard specification method. They took readings, and made corrections for voltage or pressure, but that was a service test and not a rated test. He had never taken a rated B.E.S.A. test in the street, and should not like to be asked to do so, because weeks of preparation and nights of testing would be necessary, unless there was considerable agreement between the parties concerned as to the assumptions to be made.

The Lighting of Birmingham.

The paper by **Mr. R. Mason** was read by Mr. R. MacKenzie (assistant superintendent of the Lighting Department, Birmingham) in the absence of the author due to illness.

Less than 1 per cent. of the public lighting in Birmingham is carried out by electricity. At the present time there are in the city 31,640 lamps; these comprise 31,145 gas lamps and 495 electric lamps.

The electric lamps are fixed in the vicinity of the Hall of Memory, and along a portion of Broad Street. Here the illumination gradually, and almost imperceptibly, diminishes as one recedes from the city. Starting with a few 1,500-watt lamps, there is a reduction to 1,000 watts and then to 500 watts. The columns on each side of the carriageway are spaced at about 25 yards apart on the alternate system, the lamps being fixed at a height of about 21 ft. This provides brilliant lighting.

It may be mentioned that the city has an area of 46,687 acres and a population of nearly one million. About 660 miles of street are lighted by gas and six miles by electricity.

Inasmuch as the paper is a statement of fact, it does not lend itself to discussion.

Public Lighting as Viewed by the Motorist.

The paper by **Mr. H. Sturgess-Wells** emphasised the need for uniformity in highway illumination, particularly for the sake of road users. He deplored the lack of co-ordination among local lighting authorities. A rural authority did not possess the power to remove a kerbstone, but could plant street lamps of any standard in any position it might think well; it could light up a parish pump but might ignore dangerous cross-roads! A smaller authority should confer with a larger neighbouring authority before installing a lighting system.

A notable omission had been made in the new Local Government Act of 1929 which transferred to County Councils control over *highways, but apparently gave them no power to deal with lighting.*

He believed that though the *Ministry of Transport* had power over the lighting of motor and other vehicles, it had at present *no control over public street-lighting.*

He contended that the present state of affairs imposed unduly heavy responsibility on lighting engineers, as well as strain on the drivers of all vehicles. He put forward several points as subjects for legal enactment to improve the safety of streets.

Mr. T. A. Kingham (Borough electrical engineer, Kingston-on-Thames) opened the discussion. He stated his belief that 95 per cent. of the towns in England had not re-arranged their street lamp spacing since 1890; they were still 80 yards apart, and that was wrong. Further, in some towns the street lamps were extinguished at midnight. If street lighting were maintained as it should be, the people would come into the towns to look at the shop windows—and there would be no need for a cheap window-lighting rate.

Mr. C. S. Shapley, of Leeds (past-president of the Institution of Gas Engineers), challenged the statement that 95 per cent. of the towns of the country had not altered their street lamp spacing since 1890. He did not agree with the author's views with regard to centrally suspended lamps, one of his reasons being that, in roads used by double-decked tramcars

and 'buses, the lamps had to be fixed at such a height (in order to allow the vehicles to pass beneath them) that much of the illuminating power was lost. In fog, also, he considered that side lighting was better; with central suspension the motorist was apt to lose sight of the lighting as he passed from lamp to lamp, and was apt also to look upwards instead of on to the road.

Mr. G. C. Law (deputy electrical manager and engineer, Hammersmith) suggested that the Association might concentrate a good deal of its energy upon standardising tariffs on a lower basis; he had heard from the lighting engineer of a town with 120,000 or 130,000 inhabitants that the prices charged for electricity for public lighting were 3d. per kWh for the first quarter of a million, and 1d. per kWh thereafter. In his district the load factor for public lighting was calculated at about 40 per cent., and they had decided to supply to the municipality without profit for public lighting purposes—the price working out at ¾d. per kWh. He calculated the current costs of a 100-watt lamp to be about 25s. per annum. Discussing the lighting of roads in which there were many trees, he said that when driving along one such road in his district, with centrally-suspended lamps, one had difficulty in seeing people step off the paths; therefore, in another street of the same kind, side lighting had been resorted to, and, although the cost was about twice as much as in the other case, the effect was much better.

Councillor E. J. Clarke (chairman of the Lighting Committee, Leeds) favoured side-lighting rather than central suspension, two of his reasons being that centrally suspended lamps had often to be fixed at a considerable height in order to allow traffic to pass underneath, and that curious shadows were cast by the traffic passing beneath them.

Mr. H. Davies (gas engineer and manager, Chesterfield) said that in some towns it was the custom to ask the gas, electricity, highways and watch committees each to appoint two representatives to constitute the lighting committee; in such cases the latter committee was not a standing committee, and, though it had powers to requisition funds from the Finance Committee, very often the money advanced for public lighting was not a reasonable figure in relation to the needs.

Mr. S. J. Patmore (G.E.C.), as a motorist, said he wished that all local authorities would maintain the street lighting all night. With regard to danger signals, he said he had been responsible for the design of an attachment for the Ministry of Transport's signals, and had been pleased to note the recent recommendations of the Ministry that, wherever possible, the danger signals should be illuminated at night. It was the usual experience that where the lighting was improved in the streets, the shopkeepers would automatically improve the lighting of their shop interiors and windows.

Mr. A. W. Blake (chief electrical engineer, Willesden U.D.C.) doubted whether public lighting had anything to do with the degree of street accidents.

Mr. Sturgess-Wells, in his reply, emphasised the importance of designing a lighting scheme so that it could be improved without having to be re-designed as the district developed; at Oadby, care had been taken to design it so that, when necessary, extra lamps could be installed between the existing lamps. As to the status of lighting committees, he urged that, inasmuch as public lighting was an essential service, the committees should be independent, rather than sub-committees.

Annual Meeting.

Mr. W. H. Chapman (London), Mr. S. B. Langlands (Glasgow), and Mr. E. M. Severn (South Metropolitan Gas Co.) were elected to fill vacancies on the Council.

It was left to the Council to appoint the four sub-committees (*i.e.*, to deal with Parliamentary, tariffs, safety, and technical matters) suggested by the president. The general view appeared to be that, in view of the great importance of the tariff problem, it was desirable that the appointment of that sub-committee should be proceeded with as early as possible.

Mr. A. C. Cramb (past-president) was anxious that the representation on the sub-committees of members who were attached either to gas or electricity undertakings (as distinct from the independent lighting engineers) should be in the proportion of fifty-fifty, and he was assured by the president that that suggestion should be borne in mind.

A brief reference to the preliminary arrangements for the eighth annual meeting of the Association, which it was proposed should be held in Edinburgh in September, 1931, conjointly with the Edinburgh sessions of the International Illumination Congress, 1931, was made by Colonel C. H. Silvester Evans (hon. general secretary of the Congress). He intimated that some 14 countries would be represented there, and it appeared that there would be about 600 delegates present. He said that Mr. R. Beveridge (inspector of lighting at Edinburgh), who had agreed to act as president of the Association for 1930-31, had consented also to act as convener of the Edinburgh Committee, and had a number of the preliminary arrangements in hand.

In view of the resignation of Capt. W. J. Liberty from the office of hon. secretary of the Association, it was announced that arrangements had been made whereby Mr. J. S. Dow (honorary secretary of the Illuminating Engineering Society, and editor of *The Journal of Good Lighting*) would become hon. secretary of the Association.

The Annual Dinner.

The annual dinner of the Association, held at the Grand Hotel, Leicester, on Wednesday evening, September 10th, was presided over by Mr. T. Wilkie (the president).

As a token of the members' appreciation of the great services of Capt. W. J. Liberty (the retiring hon. secretary) for his great services, not only in the formation of the Association, but in its development since that time, a wallet was presented to him by Mr. S. B. Langlands (the Association s first president). Mr. Langlands made reference to the beginnings of the Association, and gave Mr. Liberty full credit for having been the means of bringing it into being.

Capt. Liberty, in the course if his response, assured the members how very highly he valued the friendships he had made, and hoped to retain for many years, as the result of his connection with the Association.

A toast to "The City of Leicester" was proposed by the Lord Mayor of Nottingham (Councillor W. Weston, J.P.), and responded to by the Lord Mayor of Leicester (Councillor W. E. Hincks, O.B.E., J.P.).

Alderman W. E. Wilford, J.P. (vice-chairman of the Watch Committee, Leicester), proposed the toast of "The Association of Public Lighting Engineers." His first theme was the rapid development, during the last few years, of the public lighting service from the position of one of the Cinderellas of civic activity to the status it has already achieved. He felt convinced that nothing could have had more to do with that improvement than the work done by the Association, the formation of which owed much to the Lord Mayor of Leicester, who had also served as chairman of the city's Lighting Committee. After a tribute to Mr. Wilkie for the ingenuity and assiduity he had devoted to the improvement of the public lighting in Leicester, and for having, by his methods, enlisted the support of the general public, he emphasised the fact that the Lighting Committee of the city was perfectly neutral as between the claims of electricity and gas as public lighting media, thus ensuring that Leicester should take advantage of either, without favour, wherever it was most applicable. He coupled with the toast the name of Mr. Wilkie, the president.

Mr. Wilkie, responding, thanked the Lord Mayor and Corporation of Leicester, and the officials, including the staff of his own department, for the great hospitality extended to the Association during its conference, and for the support they had given him in connection with the preparations.

Mr. Harold Davies (engineer and general manager, Chesterfield Corporation Gas Department) proposed the toast of "The Visitors." **Mr. Harold E. Copp** (president of the Institution of Gas Engineers) responded, conveying the best wishes of his Institution to the Association.

Mr. John W. T. Walsh (president of the Illuminating Engineering Society), who also responded, said that the manner in which the subject of illumination had been regarded in the past was well illustrated by the story told by the late Mr. Leon Gaster (who was secretary of the Society) that, not many years ago, when looking up the word "illumination" in an encyclopædia, he had found the entry "Illumination—see Fireworks." Dr. Walsh prophesied that the Association of Public Lighting Engineers had still a long fight before it, but it had the sympathy and good wishes, and the hearty co-operation, of the municipalities and technical bodies of the country.

Mr. John Mould, A.M.I.E.E. (city electrical engineer, Leicester) replied on behalf of the Institution of Electrical Engineers—in the unavoidable absence of its president, Sir Thomas Purves. He attributed the remarkable progress made in scientific illumination during the last decade in very great measure to the co-operation between the manufacturers, the Association, and kindred bodies. Speaking for the Institution of Electrical Engineers, he assured the Association that that progress was a source of great pleasure to it, and the Institution hoped that that progress would continue. Perhaps he was in a better position than anyone to be able to judge Mr. Wilkie's work in Leicester, and Leicester had benefited very much by Mr. Wilkie's contact with his fellow members of the Association.

On Thursday morning the members inspected many of the industrial establishments in Leicester, and in the afternoon they enjoyed a motor tour through Warwickshire to Leamington Spa, where they were received by His Worship the Mayor of Leamington (Councillor R. F. Bury), and were entertained to tea by the chairman and directors of the Leamington Priors Gas Company.

Comparative Tests of Street-lighting Installations.

The following additional information has been received respecting the tests carried out on the night of September 9th. The eight types of street lighting which were the subject of comparison were as follows. (1) Bare filament lamps. (2) A special type of cut-off fitting, glare being eliminated from all but the first lamp. (3) A non-directive fitting in which the source was large and had a comparatively low surface brightness. (4) A symmetrical directive fitting. (5) An asymmetrical axial directive fitting. (6) An asymmetrical non-axial directive fitting. (7) A second type of asymmetrical non-axial directive fitting. (8) An asymmetrical axial directive fitting with light source visible. The power supplies to the fittings were so adjusted that in each case the average illumination of the carriage-way was the same, *i.e.*, 0.31 foot-candle. The mounting height, spacing, and effective road width were the same for all the installations.

Electrical Imports of British Malaya.

Comparison of Two Years' Figures.

BELOW are given the values during 1928 and 1929 of the imports of electrical and allied material into British Malaya, together with notes of increases or decreases in the trade. (The Straits dollar has a value of 2s. 4d.)

	1928. $	1929. $	Inc. or dec. $
Wire and cable, insulated—			
Total	2,187,000	1,943,000	− 244,000
From United Kingdom ...	2,124,000	1,871,000	− 253,000
,, Japan	12,800	11,900	− 900
,, United States	1,800	2,900	+ 1,100
Telegraph and telephone instruments and apparatus—			
Total	686,000	792,000*	+ 106,000
From United Kingdom ...	656,000	762,000	+ 106,000
,, United States	5,900	8,800	+ 2,900
,, Continent of Europe...	6,700	12,100	+ 5,400
Electric lamps and parts—			
Total	106,000	156,000	+ 50,000
From United Kingdom ...	42,000	55,900	+ 13,900
,, Continent of Europe...	57,000	88,800	+ 31,800
Electric lamp bulbs—			
Total	348,000	536,000	+ 188,000
From United Kingdom ...	152,000	204,000	+ 52,000
,, Continent of Europe...	123,000	188,000	+ 65,000
,, United States	36,600	94,000	+ 57,400
,, Japan	31,600	39,800	+ 8,200
Hand flash lamps—			
Total	360,000	613,000	+ 253,000
From United Kingdom ...	2,900	1,800	− 1,100
,, United States	308,000	450,000	+ 142,000
Batteries and accumulators—			
Total	744,000	1,075,000	+ 331,000
From United Kingdom ...	84,000	141,000	+ 57,000
,, Japan	3,900	2,300	− 1,600
,, United States	495,000	843,000	+ 348,000
Electric lighting accessories and fittings—			
Total	292,000	333,000	+ 41,000
From United Kingdom ...	212,000	222,000	+ 10,000
,, Continent of Europe...	42,000	71,000	+ 29,000
,, Japan	34,000	30,000	− 4,000
,, United States	1,000	1,100	+ 100
Electrical goods and apparatus (not machinery) not elsewhere mentioned—			
Total	2,146,000	1,239,000	− 907,000
From United Kingdom ...	1,879,000	1,033,000	− 846,000
,, Continent of Europe...	92,700	99,800	+ 7,100
,, United States	160,000	96,000	− 64,000
Electric generators—			
Total	130,000	102,000	− 28,000
From United Kingdom ...	119,000	91,000	− 28,000
,, Continent of Europe...	3,700	9,600	+ 5,900
,, United States	300	300	—
Motors—			
Total	538,000	485,000	− 53,000
From United Kingdom ...	420,000	393,000	− 27,000
,, Continent of Europe...	90,000	43,000	− 47,000
,, United States	11,000	42,000	+ 31,000
Ignition magnetos—			
Total	32,000	19,000	− 13,000
From United Kingdom ...	3,500	3,000	− 500
,, Continent of Europe...	24,000	12,800	− 11,200
,, United States	3,500	1,900	− 1,600
Other electrical machinery—			
Total	2,403,000	2,883,000†	+ 480,000
From United Kingdom ...	2,184,000	2,351,000	+ 167,000
,, Continent of Europe...	166,000	30,000	− 136,000
,, United States	41,000	494,000	+ 453,000

* Including wireless apparatus: Total $115,000, $100,500 from United Kingdom.

† Including convertors and transformers: Total $706,000, $691,000 from United Kingdom.

Swedish Electrical Imports.

The imports of electrical machinery into Sweden during July last amounted to a value of £114,920, bringing up the total for the first seven months of the year to £718,545, as compared with only £522,140 in the corresponding period of 1929. The exports of Swedish electrical machinery in July last amounted to £169,060, making a total for the seven months of £1,736,995, as compared with £1,679,335 in the similar period a year ago.

Reviews.

High-voltage Oil Circuit Breakers. By R. WILKINS and E. A. CRELLIN. Pp. ix+301; figs. 121. London: McGraw-Hill Publishing Co., Ltd. Price 20s. net.

It is a good sign that in present-day electrical engineering literature, many of the books which are published fall quite naturally into the category of unique productions by virtue either of subject matter or treatment. This, of course, is accounted for by the rapid developments which are taking place in the manufacture of electrical plant and apparatus, in fundamental and applied research, and in the application of electricity to purposes undreamt of a decade ago.

The present volume is unique because, so far, very little has appeared in book form on the subject, while, in addition, it is written chiefly from the user's standpoint. It is divided into four parts which deal, respectively, with the history of h.v. oil circuit breakers, theory and discussion, modern high-voltage breakers, and field tests. In the first part the authors describe the earlier types of switches in generating stations and the first high-voltage switches and oil circuit breakers. The second part is concerned with the theory of arc phenomena, the dependence of arc suppression and arc energy absorption upon circuit-breaker design and those factors in breaker design which depend upon circuit conditions. In the third part the authors deal with modern high-voltage breakers, describing therein chiefly the constructions and principles of operation of breakers manufactured by leading American makers. A short chapter is devoted to European practice. The recently developed "De-ion" breaker is described. A valuable feature of this section is the tables which are given of the ratings and physical characteristics of 73-kV, 110-kV, and 220-kV American oil-circuit breakers for rupturing capacities below one million kVA and above one million kVA. An excellent chapter is included on terminal bushings, as also is one on actuating equipment. In the fourth part the authors describe field tests made by various power supply companies on different makes of circuit breakers, and the results are given in tabular form as well as being illustrated by oscillograms.

The book is concerned chiefly with American designs and, being profusely illustrated with line drawings and photographs, it should be of considerable interest to European engineers.

In view of the research work at present being undertaken in different countries on high-voltage circuit breakers, we think the authors have been wise in confining their treatment principally to the user's views, for there seems little doubt that the next few years will see radical changes in the design of high-voltage circuit breakers for controlling large amounts of power.

The book is a valuable addition to the electrical engineer's library, and we can recommend it to all branches of the profession.

S.A.S.

Trade Mark Law and Practice. By A. W. GRIFFITHS, B.Sc., Barrister-at-law. Pp. xi+252. London: Sir Isaac Pitman & Sons, Ltd. Price 10s. 6d.

One of the chief difficulties to be faced in writing a text-book on the law of trade marks (or indeed, on any branch of the law) is to know exactly what to put in or leave out, and how far to go. By the time one has paraphrased and explained in brief the various Trade Marks Acts, there is, if the book is to be a short one, little room for anything else. Mr. A. W. Griffiths in this little treatise has adopted a form of compromise which is becoming popular with legal writers; he has set out the statutes with the statutory rules and forms in full in the appendices, and has, in the body of the book, given a concise explanation of the statutes and the principal decisions concerning their interpretation. The result is that the appendices occupy half the book. One begins to wonder whether it would not be advisable for publishers, instead of increasing the thickness of such books by reprinting the statutes, to provide readers with a little more "book," and give away the statutes, already adequately printed by the King's printers, as a makeweight; but that perhaps presents difficulties which only publishers can foresee.

The result in the present case is that Mr. Griffiths has to himself (by choice or circumstance) only about 100 pages in which to explain the law of trade marks, with chapters on passing-off, goodwill, and trade names. The result is, as can be expected, merely a concise statement of outlines. The student who is reading for an examination on the law of trade marks, and the business man who wishes to obtain a general grasp of the law, will find this work extremely useful both for study and for reference. The legal practitioner will not be helped a great deal, since trade mark law, depending as it does on the application of statutory definitions to varying circumstances, cannot be adequately dealt with without frequent and considerable reference to the numerous decided cases. For the lawyer the heavier and more detailed text-books will hold the field.

Mr. Griffiths's book does not deal with trade mark practice as distinct from law. Business men who wish to negotiate

their own trade mark application will find little assistance here. The book, of course, does not pretend to treat of trade mark practice; but the fact that a legal text-book can give a fair statement of the law without providing any assistance in practical procedure indicates the necessity for the trade marks agent as well as the legal adviser.

Business men who wish to have means of advising themselves fully should have a volume dealing with trade marks practice beside Mr. Griffiths's little treatise. With such an equipment the layman will not only be able to inform himself generally on the subject, and perhaps satisfy his curiosity on possible points, but he may also be able on many occasions to avoid consulting a lawyer.

It is said that a good lawyer will keep you out of court. A good text-book will keep you away from the lawyer. Laymen who will not expect in 111 pages to get the last word on trade marks law, and will be content with a brief, but adequate, summary of essential matters, will find Mr. Griffiths's work a useful and possibly money-saving investment.

W.E.J.

Correspondence.

***Correspondents should forward their communications as early as possible.** No letter can be published unless we have the writer's name and address in our possession.*

Electricity for the Home.

Regarding myself as one of the many housewives who are ever ready to learn of any new electrical contrivance on the market for improving conditions in the house, I was greatly amused by the article under the heading of "My Lady's Pleasure" in this week's issue of the ELECTRICAL REVIEW.

I agree that when electricity is taken into every village, and to every isolated cottage, the housewife will be able to enjoy and realise what a boon electricity really is, but it is surprising how many ordinary individuals are well acquainted with quite a number of electrical appliances, which have been on the market for the last few years.

The vacuum cleaner and the iron need no introduction, but I was more than surprised to find the writer condemning electric cookers, for which I am very sorry—perhaps the lady does not know how to get the best results out of hers—but I can assure her that any novice could use an electric cooker. Personally, I have no other means of cooking, and I find that to cook for a family of six is the easiest of matters; once a week I run out bread, which comes out in 45 minutes done a beautiful crisp brown, and three times a week I use my oven to make the most delicious and tempting of pies and cakes. Another advantage is being able to regulate one's oven; one may go out and leave things cooking inside, and know that they will be just right, which is a boon to a busy housewife without help. Then the griller on top may be used for frying, grilling, and toasting to advantage, and I may say that our cooker is 5 years' old, and I look round with envy at some of the models on the market to-day.

The other electrical appliances mentioned are all well known to the public, and have each their individual merits.

As for power it is *reliable*, and no doubt, as it comes into more universal use, the cheaper it will become.

M. Patterson.

Leeds, *September 20th*, 1930.

Installation-work Instruction.

At a time when technical instruction for apprentices is being boosted, it may be interesting to the trade to realise the attitude of the education authorities. Recently one of the best known authorities advertised for an instructor in practical installation work. At the final interview, it was apparent that the choice of instructor was left to a committee whose knowledge of the qualification necessary was sadly lacking. Its main concern seemed to be: when the candidate last made a joint, and if he could instruct his pupils how to make a joint. The type of joint was not stated, but one could assume the married joint was meant. I should be glad if any of your readers could indicate the importance of joints in installation practice, since in my 14 years' extensive practical experience, joints were only regarded as an occasionally necessary evil to be avoided at all times. If this is the type of instruction given to our future electricians, then my opinion is that their education is better left to the men with whom they habitually work.

Further, a supply company's plumber-jointer informs me that in the whole of his experience he has only been asked to make a married joint once. That was for the purpose of a practical test, the result of which was that the staff was forbidden to make such a joint.

Electrician.

September 22nd, 1930.

Plumber-jointers and Live Work.

I have been reading a case of a jointer who was killed a few weeks ago in London, and noted the remark of a doctor on this case that immediate artificial respiration had saved the lives of some people who had received very serious shocks. I have worked as a plumber-jointer for various municipalities and contractors, and I must say that live work to-day is being treated with great contempt. Several jointers to-day think that if an engineer tells them to do a job which is rather dangerous, they have no option but to carry it out; but a jointer can refuse to carry out such work without fear of dismissal. I have seen jointers working on live cables without a mate near, a dangerous thing in my opinion. Some engineers have no thought for the plumber-jointer's safety so long as the job is done, and in a good many cases they cannot say whether a job is done in an efficient manner or not. In power houses and sub-stations safety notices are displayed very prominently, but how many men would know what to do in case of an accident? I will go so far as to say not one in four trouble to read these notices. It is time pressure was brought to bear on undertakings and contractors to instruct jointers and mates in artificial respiration, this to be carried out under an experienced man, and a certificate of proficiency issued. While I write this I hear of the death of another jointer in London. However it may be with these cases, I know of jobs where men who have been mating for less than twelve months have been given sample joints to make without a practical man to instruct them; these are regarded as plumber-jointers, and are thought just as much of as experienced men. I remember reading a few months ago a letter in the REVIEW by a plumber-jointer who stated the position of jointing and jointers very finely.

Biff.

September 15th, 1930.

[Lives have been saved by men who have taken the trouble to acquaint themselves with the very clear instructions given on the ELECTRICAL REVIEW'S "Suggestions for Dealing with Apparent Death from Electric Shock," which are in use in all parts of the world.—EDS. ELEC. REV.]

The Use of the C.M.A. Trade Mark.

Our attention has been called to a report appearing in the ELECTRICAL REVIEW of July 4th, 1930, p. 36, reporting the speech of Mr. William Cross (Past President of E.C.A.) made at the Conference at Llandudno in connection with the specifying of goods for installations. Mr. Cross is reported to have said:—

> "For instance, the term '*C.M.A. 600 Megohm Grade Cable*' only states that cable shall be of the same quality as C.M.A. Cable, instead of the term '*C.M.A. Cable, 600 Megohm Grade.*'"

We desire, however, to call the attention of any of our readers who have made a note of this statement that "C.M.A." is a registered trade mark, and that therefore any person selling cables under either of these descriptions, or using either of these descriptions in connection with the offering for sale of cables, would be infringing the trade mark if such cables were not in fact manufactured by a member of the Cable Makers' Association, whose members are persons licensed to use the mark.

Cable Makers' Association,

L. B. ATKINSON, *Director.*

London, W.C.2, *September 18th*, 1930.

That Better Job.

Regarding recent published comments, the difficulties to be faced by men of 35 years of age or more are not limited to the question of age, as many of us are continually finding out. Why on earth an age limit of 35—or even 55—should be set for posts calling for sound training backed up by wide experience, and sometimes executive ability, is difficult to understand. Jobs are frequently advertised from which men of 35-45 with the requisite experience are debarred; there must be large numbers of men whose ages come within that range, who, like myself, cannot understand why all chairmen of electricity committees, chief engineers, and others who have the fortune to be able to decide upon the suitability of men for positions are not put upon the scrap-heap if *they* are over 35 years of age. Is it that they hope to become familiar with new ideas, and unfamiliar practice?

I, for one, would be very pleased to hear of any reasonable argument which can fairly be considered to justify the age limit of 35 years, which is so often a stipulation.

It appears also that a word or two of warning might well be given to some who are looking for overseas opportunities to secure "that better job," particularly those *under* 35 years of age who have not worked abroad.

At the present time an advertisement is appearing in the technical press inviting applications for *engineers* for India. One post vacant is that of power house superintendent, and the writer, who was interviewed by the advertiser's engineer this week, was told that his was the most suitable application received for that post. The job covers responsibility for a Diesel station, to which two 1,500-kW turbo-generators are shortly to be added (presumably the necessary steam-generating plant will also be installed), the labour is purely Indian, and all the "important" work in the station will have to be done by the power house superintendent.

Obviously, these duties call for a highly skilled man. Yet, although the advertisement reads "Terms will include a free residence and provident fund, and will otherwise depend upon qualifications," the maximum salary offered is £400 p.a. And in India!

It seems in view of these facts that the E.P.E.A. ought, in the interests of inexperienced men, to commence an Indian section, and thus save the time and hopes of those who apply for posts under "box numbers" in the technical Press.

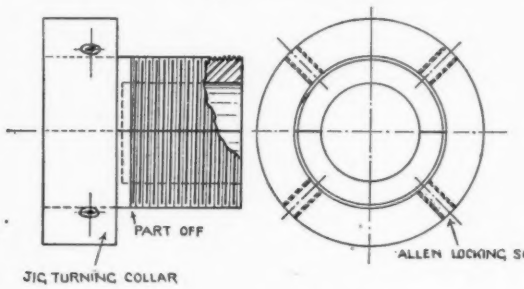
F. E. Dup.

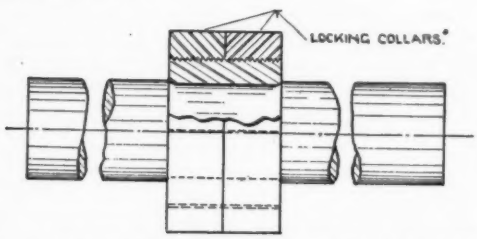
September 22nd, 1930.

Minimising Breakdowns.

With reference to Mr. J. T. Towlson's interesting article contained in your issue of the 12th inst. regarding thrust collars, a simpler and more efficient method of obtaining the desired result is indicated in the accompanying sketches.

Fig. 1 shows the modern method of turning and screwing a split collar, which obviates all sweating; fig. 2 shows the





Figs. 1 and 2.—Details of Split and Locking Collars.

split and locking collars in position, from which it will be seen that the split collars must grip their whole length.

If the thrust was being carried on a pillow block face a gun-metal thrust washer would be added.

W. W. F. Denné.

London, E.C.4, *September 17th*, 1930.

Published Specifications.

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1929.

5,579. "Electric cut-outs and the like." G. O. Donovan and W. Donovan. February 20th, 1929. (334,176.)

9,540. "Sound-reproducing apparatus, such as loud-speaking telephonic receivers." F. X. L. H. M. G. Bonnier. March 31st, 1928. (308,801.)

9,586. "Electric circuit interrupters." British Thomson-Houston Co., Ltd. March 23rd, 1928. (Addition to 308,611.) (308,654.)

9,627. "Fuses." British Thomson-Houston Co., Ltd. March 23rd, 1928. (308,665.)

12,547. "Mouthpieces for telephone transmitters." A. Marr. April 23rd, 1929. (334,196.)

13,229. "Electric selectors." Siemens Bros. & Co., Ltd., and H. E. Humphries. April 29th, 1929. (Cognate applications 21,985/29 and 23,022/29.) (334,205.)

15,774. "Apparatus for the lubrication of sliding bows of current collectors of electric vehicles.' J. F. de Tovaros. May 21st, 1929. (334,182.)

15,850. "Connecting device for use with stranded metal cables." British Insulated Cables, Ltd., and J. W. Astley. May 22nd, 1929. (334,229.)

16,438. "Melting metal or heating molten metal in an electrical furnace, and a furnace for carrying out the said process." K. G. Wennerstrom. May 28th, 1929. (334,201.)

16,550. "Method of electrical television." A. Codelli. May 29th, 1929. (334,234.)

16,568. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., C. Gillings, and T. G. Rice. May 29th, 1929. (334,218.)

16,569. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., and T. G. Rice. May 29th, 1929. (334,219.)

16,596. "Arrangement for preventing back ignition in metal-vapour discharge tubes, especially mercury-vapour rectifiers." Maschinenfabrik-Oerlikon. June 2nd, 1928. (312,920.)

16,606. "Electrical plunger contacts such as used in lampholders." J. A. Crabtree and B. G. Harrison. May 30th, 1929. (334,235.)

16,641. "Power condenser employed in particular for automatic phase regulation." C. Neff. May 31st, 1928. (312,692.)

16,678. "Construction of electric motors." H. H. Kalber. May 30th, 1929. (334,238.)

16,728. "Fluid pressure-operated control systems and relay apparatus." T. Blackiock, G. W. Higgs-Walker and Associated Electrical Industries, Ltd. May 30th, 1929. (334,244.)

16,783. "Automatic or semi-automatic telephone exchange systems." Standard Telephones and Cables, Ltd., and E. P. G. Wright. May 31st, 1929. (334,247.)

16,784. "Automatic or semi-automatic telephone systems." Standard Telephones and Cables, Ltd., and E. P. G. Wright. May 31st, 1929. (334,248.)

16,785. "Lead alloy for electric cable sheath and other purposes." Standard Telephones and Cables, Ltd. June 29th, 1928. (314,522.)

16,841. "Vacuum electric tube devices." E. Y. Robinson and Associated Electrical Industries, Ltd. May 31st, 1929. (Cognate application, 23,736/29.) (334,256.)

16,863. "Telephone systems." Automatic Telephone Manufacturing Co., Ltd., C. Gillings, and W. H. Paulett. May 31st, 1929. (334,257.)

16,918. "Electric remote-control systems." A. Reyrolle & Co., Ltd., B. H. Leeson, W. Anderson, and D. E. Lambert. June 1st, 1929. (334,263.)

16,919. "Selective indicating mechanism." A. Reyrolle & Co., Ltd., F. N. Linstow, and W. Anderson. June 1st, 1929. (334,264.)

16,932. "Making carbon electrodes and the like." Roessler & Hasslacher Chemical Co. June 1st, 1928. (312,940.)

17,048. "Magneto electric ignition apparatus." Scintilla Akt. Ges. July 16th, 1928. (315,696.)

17,058. "Telephone systems." Standard Telephones and Cables, Ltd., and E. P. G. Wright. June 4th, 1929. (334,279.)

17,185. "Sealed glass envelopes for incandescent electric lamps and the like." N. E. Paine and W. E. Bothell. June 4th, 1929. (334,285.)

17,304. "Electric road vehicles." C. J. Gordon. June 5th, 1929. (334,288.)

17,305. "Electric circuit interrupters." Associated Electrical Industries, Ltd. (Westinghouse Electric and Manufacturing Co.). June 5th, 1929. (334,289.)

17,382. "Protective systems for alternating-current systems." T. W. Ross and Associated Electrical Industries, Ltd. June 6th, 1929. (334,291.)

17,383. "Protective systems for electrical distribution systems." T. W. Ross and Associated Electrical Industries, Ltd. June 6th, 1929. (334,292.)

17,421. "Electric cables." Soc. Italiana Pirelli and L. Emanueli. June 6th, 1929. (334,293.)

17,458. "Telephone instruments." Mullard Radio Valve Co., Ltd., and C. F. M. Hayes. June 6th, 1929. (Addition to 308,448.) (334,294.)

17,703. "Starters for direct-current motors." Kabushiki-Kaisha Hitachisei-sakusho. June 20th, 1928. (313,959.)

17,734. "Vacuum electric tube devices." E. Y. Robinson and Associated Electrical Industries, Ltd. June 10th, 1929. (334,298.)

17,354. "High-tension electric cables." Soc. Italiana Pirelli and L. Emanueli. June 11th, 1929. (334,299.)

18,143. "Electric fuses." J. A. Crabtree. June 13th, 1929. (334,301.)

18,836. "Socket-holders for thermionic valves or other plug-in elements." Pye Radio, Ltd., and T. A. W. Robinson. June 19th, 1929. (334,310.)

20,127. "Electromagnetic driving unit for loud-speakers." J. Lenzen (trading as Lenzen & Co. (Firm of)). June 30th, 1928. (314,700.)

20,194. "Electric lighting installations." S. G. S. Dicker (Naamloose Vennootschap Philips' Gloeilampenfabrieken). July 1st, 1929. (334,316.)

21,161. "Electric switch installations." S. Ruppel. July 10th, 1929. (334,321.)

21,268. "Electric lamp mountings for instrument panels or the like." Pioneer Instrument Co., Inc. March 26th, 1929. (334,324.)

21,367. "Means for producing extra high voltages." Callender's Cable and Construction Co., Ltd., and F. S. Smith. July 11th, 1929. (334,327.)

21,500. "Electric circuit-breaker apparatus for large outputs." Siemens-Schuckertwerke Akt. Ges. July 13th, 1928. (315,419.)

22,697. "Photo-electric cell." E. G. O. Pressler, A. E. M. Pressler, and K. E. H. Pressler (trading as O. Pressler, Thuringer Vakuumrohrenfabrik und Fabrik Wissenschaftlicher Apparate). August 6th, 1928. (316,937.)

23,363. "Wireless direction-finding systems." R. T. Smith. July 30th, 1929. (334,341.)

23,837. "Mounting cone diaphragms of loud-speakers and the like." F. M. Laserson. August 2nd, 1929. (334,350.)

23,845. "Electric circuit arrangements for signalling installations indicator boards and the like." C. Lorenz Akt. Ges. April 15th, 1929. (334,351.)

24,316. "High-tension electric switches." Siemens-Schuckertwerke Akt. Ges. August 17th, 1928. (317,481.)

24,399. "Combined sound and moving picture films." I. G. Farbenindustrie Akt. Ges. January 3rd, 1929. (Addition to 315,842.) (334,359.)

24,516. "Voltage-regulating devices for dynamo-electric machines." C. Lorenz Akt. Ges. August 11th, 1928. (317,094.)

24,749. "Apparatus for broadcasting documents." Etablissements E. Belin. August 22nd, 1928. (317,787.)

28,335. "Regeneration of the lead plates of electric accumulators." E. Feifelson. September 18th, 1929. (334,393.)

28,382. "Lighting systems of motor vehicles and the like." C. A. Paulusz and H. J. Whitehouse. September 19th, 1929. (334,394.)

28,897. "Street traffic signals." Forest City Electric Co., Ltd., and S. T. Quiliam. September 24th, 1929. (334,402.)

29,584. "Photo-sensitive cells." Arcturus Radio Tube Co. March 10th, 1929. (334,409.)

29,626. "Electron-discharge tubes." Marconi's Wireless Telegraph Co., Ltd. September 28th, 1928. (320,022.)

31,015. "Electric dry cell." Siemens Bros. & Co., Ltd., and C. F. Edwin. October 12th, 1929. (334,420.)

32,336. "Electric distribution systems." International General Electric Co., Inc. October 24th, 1928. (334,431.)

32,355. "Subaqueous sound apparatus." Electroacustic Ges. December 3rd, 1928. (334,432.)

33,841. "Train-lighting electric generators." C. Lorenz Akt. Ges. November 16th, 1928. (334,444.)

34,198. "Modulating devices for changing the frequencies of electric currents." Soc. Française Radio-Electrique. November 18th, 1928. (334,445.)

36,485. "Ventilation of dynamo-electric machines." Associated Electrical Industries, Ltd. December 7th, 1928. (334,456.)

37,323. "Thermionic cathodes." Westinghouse Electric and Manufacturing Co. December 14th, 1928. (334,460.)

37,907. "Caps for carbon electrodes." E. Kleinmann and A. Mendel (trading as Kleinmann Geb.). December 10th, 1929. (334,463.)

39,096. "Electric switches." S. Ruppel. December 21st, 1928. (334,471.)

39,412. "Electric turbo-generator plants." Akt. Ges. Brown, Boveri et Cie. December 24th, 1928. (334,473.)

1930.

350. "Dynamometers." A. K. Croad (Metal Stamping Co.). January 3rd, 1930. (334,478.)

8,174. "Apparatus for producing sound." British Thomson-Houston Co., Ltd. March 14th, 1929. (334,493.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 17th:—

Vandavac. No. 515,455. Class 6. Vacuum cleaning machines.—A. Vandam & Co., Ltd., Caxton House, Tothill Street, Westminster, S.W.1.

Claritone. No. 514,002 Class 8. Wireless-telephonic and telegraphic apparatus and parts thereof.—Ashley Wireless Telephone Co. (1925), Ltd., 17, Finch Place, London Road, Liverpool.

Lectaerial. No. 514,632. Class 8. Aerials for use in wireless-telephony.—S. Kalisky (Aldgate), Ltd., 75, High Street, Aldgate, E.C.3.

Wavemaster. No. 514,737. Class 8. Wireless-telephonic and telegraphic instruments.—Webb Condenser Co., Ltd., 42, Hatton Garden, E.C.1.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABBOTS LANGLEY (HERTS.).—Asbestos factory; Universal Housing Co., Rickmansworth, builders.

BEACONSFIELD.—Houses (124) for the U.D.C.; G. Jefferson, builder, High Wycombe.

BERKHAMSTED.—Houses (46) for the U.D.C.; S. Gilbert and Sons, builders.

BIRMINGHAM.—R.C. schools; Mother Superior, St. John's Convent, Gravelly Hill.

BISHOP AUCKLAND.—Dining hall, &c., at the grammar school; F. Ailley, county architect, 34, Old Elvet, Durham.

BLAYDON.—Public elementary school, Winlaton (440 places); T. B. Tilley, director of education, Shire Hall, Durham.

BLYTH.—Schools and extensions (2,000 places); borough engineer.

BOOTLE.—Houses (229), off Aintree Road and Fernhill Road; borough engineer.

BRIGHTLING (SUSSEX).—Re-erection of portion of Brightling Place (mansion) for Major T. P. Tew, Brightling Park.

BRISTOL.—R.C. school for St. Bernard's, Shirehampton; Rev. R. V. Hackett, parish priest.

BROMLEY (KENT).—School, Burnt Ash, for the borough E.C.; director of education.

CAMBRIDGE.—Extensions, Magdalene College; Sir Edwin Lutyens, architect. Two schools, Romsey Town and Greenend Road, with electrical work; secretary to the borough E.C. Gymnasium, Cambridge High School for Girls, and extensions, School of Arts, Crafts and Technology, for the E.C.; H. H. Dunn, county architect, County Hall.

CHESTERFIELD.—Extensions, Old Whittington senior school, for the borough E.C.; Wilcockson & Cutts, architects, 12, Saltergate.

DEAL.—Cinema, Queen Street, with electrical and heating work; William Ellis, architect, 106, Regent Street, London, W.

DORSET.—Small-pox hospital; County Council.

DUNFERMLINE.—Houses (88) for the T.C.; burgh engineer. Concert hall and winter garden (£50,000) for the Carnegie Trust; Sir George Washington Browne, architect, Edinburgh.

EDINBURGH.—Houses (78), Stenhouse Street; city architect.

EPPING.—Administration block at isolation hospital for R.D.C.; W. Beard, building surveyor, Harlow.

GLASGOW.—Houses (54), Haghill estate; housing director and trade contractors. Isolation hospital, Barrhead Road; city engineer. Reconstruction of South Wellington Street police office (electrical installation); Master of Works, City Chambers. Schools, Lorne Street, King's Park, and Smythcroft Road, for the E.C.

HAVERSTOCK HILL.—Nurses' home for Charing Cross Hospital; H. Goslett, architect.

IRISH FREE STATE (DUBLIN).—Addition to the tobacco warehouse at the Custom House docks; Port and Docks Board engineer, East Wall, Dublin, C.10.
(TRALEE, CO. KERRY).—Houses (30) for Tralee U.D.C., at Castle Countess; O. G. Tough, town surveyor.

LEIGH (LANCS.).—Houses (120); borough engineer.

LEXDEN AND WINSTREE (COLCHESTER).—Houses (46) for the R.D.C.; surveyor.

LICHFIELD.—Extensions to sewage disposal works, Lynn; C. E. May, engineer to R.D.C., Council House.

LONDON (ILFORD, E.).—Houses (30), Beech Grove and Church Road; C. Fryatt. Houses (37), Goodmayes Lane; Stoneley & Co. Houses (88), Sunnymede Drive and Rosedene Gardens; T. Anders. Bank, Cranbrook Road; Lloyds Bank, Ltd. Factory for the Plessey Co., Vicarage Lane; F. F. Doyle.
(E.C.).—Business premises, Upper Thames Street; M. E. and O. H. Collins, architects.
(ST. MARYLEBONE, N.W.).—Shops and flats, Edgware Road; Marshall & Tweedy, architects.
(BECKENHAM, S.E.).—Municipal offices (£88,000) for the U.D.C.; surveyor.

MAIDSTONE.—Extensions, Tonbridge Road schools, for the borough E.C.; T. F. Bunting, borough surveyor.

MALDEN.—Houses (210), Worcester Park, for W. H. White.

MALLING.—Sewage disposal works at East Malling and Ditton; W. O. Humphrey, 17, London Road, Hailsham, Sussex.

MARGATE.—Re-erection of portion of Dreamland Park (£20,000); Mr. Iles.

MOTHERWELL. — Sewage disposal works, Linshaw (£50,000); burgh surveyor.

NEWPORT (MON.).—Museum and art gallery, Belle Vue (£25,000); borough engineer.

OLDHAM.—Extensions, Boundary Hospital (£32,000) and Central library; borough engineer. Branch school, Skipton Street; the trustees, Hope Congregational Church.

PAIGNTON.—Abattoir, Holloways Hill; U.D.C. surveyor.

PAISLEY.—Cinema for Scottish Cinema and Variety Theatres, Ltd., 105, St. Vincent Street, Glasgow; the secretary.

PETERBOROUGH.—Houses (38) for the T.C.; W. H. A. Court, city engineer.

ROSS (HEREFORDSHIRE).—R.C. church; Father J. McCarthy.

ROTHERHAM.—Houses (100) for the R.D.C. surveyor.

SALOP.—Schools, Madeley, Wrockwardine Wood, and Hodnet, for the E.C.; education architect, Shrewsbury.

SEVENOAKS.—Premises for F. D. Ibbett & Co., High Street; C. J. Cable, architect.

STOCKPORT.—Extensions, Woodbank Hall, for the T.C.; H. Hamer, borough surveyor.

SURREY.—Extensions, Brookwood and Netherne Mental Hospitals, including blocks for 240 patients, for the C.C.; F. J. Hodgson, architect, 201, High Street, Guildford.

SWANSEA.—Extensions, Glanmor secondary school, for the E.C.

SWINDON.—Houses (200), Hurst estate, and Town Hall extensions; borough engineer.

SWINTON & PENDLEBURY.—Two schools (1,700 places) for the E.C.; Vincent Collinge, acting clerk.

THORNABY-ON-TEES.—Houses (72) for the T.C.; J. McCreton, Ltd., builders, North Ormesby.

WALLINGFORD.—Houses (30), Didcot, for the R.D.C.; F. H. Floyd, architect, 20, Market Place, Newbury, Berks.

WATFORD.—Laboratory extensions, Garston building research station, for H.M. Office of Works, King Charles Street, S.W.

WESTON-SUPER-MARE.—Houses (32) for the U.D.C.; H. A. Brown, surveyor.

WHITEHAVEN.—Service station and garage for 200 cars, for Stouts' Garages, Ltd.

WREXHAM.—Rebuilding business store, Hope Street, for Montague Burton, Ltd., Leeds.

YEOVIL.—Re-erection of glove factory, Stoke-under-Ham, for E. Philips.